United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with
the Oklahoma Agricultural
Experiment Station and the
Oklahoma Conservation
Commission

Soil Survey of Oklahoma County, Oklahoma

Part I

How To Use This Soil Survey

This survey consists of maps and text. The maps include a general soil map and detailed soil maps. The text is divided into two parts. Part I includes general information about the survey area; descriptions of the general soil map units, detailed soil map units, and soil series in the area; and a description of how the soils formed. Part II describes the use and management of the soils and the major soil properties. This part may be updated as further information about soil management becomes available.

On the **general soil map**, the survey area is divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas. To find information about your general area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, and then refer to the section **General Soil Map Units** in Part I of this survey for a general description of the soils in your area.

The **detailed soil maps**, when used in conjunction with the detailed soil map unit descriptions in Part I of this publication, can be useful in planning the use and management of small areas. To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet. Locate your area of interest on the map sheet. Note the map unit symbols in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1995. Soil names and descriptions were approved in 1996. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1996. This survey was made cooperatively by the Natural Resources Conservation Service, the Oklahoma Agricultural Experiment Station, and the Oklahoma Conservation Commission. It is part of the technical assistance furnished to the Oklahoma County Conservation District.

Cover: State Capitol Building in Oklahoma City, Oklahoma.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service homepage on the World Wide Web. The address is http://www.nrcs.usda.gov.

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Foreword

This soil survey contains information that can be used in land-planning programs in Oklahoma. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

M. Darrel Dominick
State Conservationist
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Soil Survey of
Oklahoma County, Oklahoma

Fieldwork by Carl E. Woods, Jr., Bobby G. Bourlier, Allan R. Johnston, Gerald A. Sample, and Hayden D. Rounsaville, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the Oklahoma Agricultural Experiment Station and the Oklahoma Conservation Commission

Oklahoma County is in the central part of Oklahoma (fig. 1). It includes Oklahoma City, the capital of the State. The county has a total area of 549,808 acres.

This soil survey updates the survey of Oklahoma County published in 1969 (USDA, 1969). It provides additional information and has larger maps, which show the soils in greater detail.

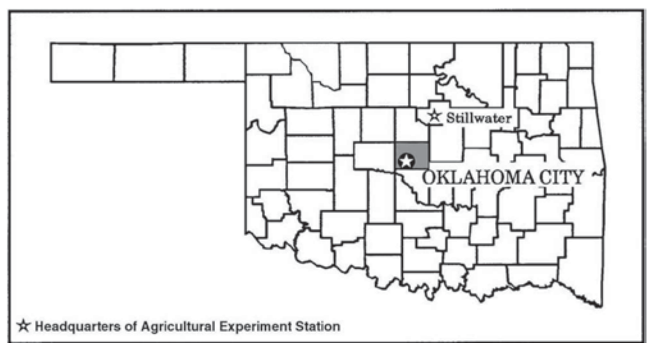

Figure 1.—Location of Oklahoma County in Oklahoma.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, soil scientists develop a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to

identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

General Nature of the County

This section gives general information about the county. It describes history; industry, transportation, and recreation; physiography, relief, and drainage; surface geology; and climate.

History

Nancy Laub, Oklahoma Historical Society, helped prepare this section.

The first known American trading expedition to reach what is now Oklahoma County was that of Thomas James, of Illinois. In early spring of 1823, members of this expedition ascended the North Canadian River in dugout canoes with a stock of goods for trade with the Comanche Indians.

In October 1832, Judge Henry L. Ellsworth, a member of an Indian removal commission, which had been appointed by President Andrew Jackson, made a journey into the interior of the Indian Territory. Escorted by a troop of rangers under the command of Captain Jesse Bean, the judge crossed Oklahoma County, camping the first night about 3 miles northeast of Edmond and the next night about one-half mile west of Arcadia. The next stop was near Crutcho Creek, 6 or 7 miles east of the present site of Oklahoma City. Washington Irving, the noted author-traveler, was along on this expedition.

Oklahoma County was rather off of the lines of the overland trails, but traders from the civilized Indian Nations occasionally traversed the Oklahoma County area in their efforts to find the camps of the wild Indians of the Plains and engage in trade with them. The fact that Chisholm Creek is still on the map in the northwestern part of the county is evidence of the occasional presence of the greatest of these traders, Jesse Chisholm. In 1858, Chisholm erected a trading post at the southern edge of a large tract of timber, 5 or 6 miles west of Oklahoma City. The following year, the U.S. Government arranged for an Indian peace council to be held at this place. Congressman John S. Phelps, of Springfield, Missouri, arrived with an escort of troops commanded by Major Benjamin L.E. Booneville. When the Comanche Indians arrived and found soldiers there, they refused to remain for the council and immediately retreated. From that time on, this place was known as Council Grove.

Several great cattle trails passed through Oklahoma County, including the Arbuckle Trail, which extended from Texas, passed near the Oklahoma City oil field, crossed the North Canadian River on the east side of the State Fair Grounds, passed northward through the present-day Nichols Hills residential district, and passed northward across the Cimarron River to where it converged with the main cattle trail. Many herds went up this trail each year until the accessibility of railway shipping facilities and the westward extension of farming activities put an end to the overland cattle driving industry in the region, a number of years before the use of the main trail terminated.

In the summer of 1884, a survey was made for the extension of the Southern Kansas Railway line from Arkansas City, Kansas, southward across the Indian Territory toward the Gulf Coast. This line was built, and service commenced in September of 1887. The line extended from Kansas City, Missouri, to Galveston, Texas. In 1891, the Choctaw, Oklahoma, and Gulf Railway Company built its lines from Fort Reno to Oklahoma City and eventually on to McAlester. In 1898, the St. Louis and San Francisco southwestern line was extended from Sapulpa to Oklahoma City and, in 1902, it was extended to Lawton. In 1904, the Missouri, Kansas, and Texas line was built from Coffeyville, Kansas, to Oklahoma City. Eventually, other lines were built through the county.

The homesteaders who settled the area that is now Oklahoma County during the Land Run of April 22, 1889, were mainly from the north and the east. In a special election on June 11, 1910, the majority of the people of Oklahoma voted to change the capital of the State from Guthrie to Oklahoma City.

Farming and ranching were the main occupations and sources of income for the early settlers. Cotton, wheat, corn, and oats were the major crops. Early farming methods consisted mostly of plowing and planting crops without regard to the lay of the land. This method of farming resulted in rapid soil erosion, loss of fertility, and loss of much needed moisture to produce a crop. As a result, many homesteaders either sold their land or abandoned it during the 1930s. Today, farming and ranching are still important enterprises. The county has more than 900 farms, and approximately 32 percent of the acreage in the county is rangeland or cropland. Oklahoma County is the chief market for the State's livestock and agricultural industries.

In December 1928, when the discovery well of the greater Oklahoma City oil field was drilled, petroleum products became a major part of the economy. Today, petroleum production is still the most important mineral activity in the county. Nearly 3 million barrels of crude oil and more than 20 billion cubic feet of natural gas are produced annually.

The population of Oklahoma County has more than doubled over the past 50 years. Currently, the population is 623,800 and the population density is approximately 846 persons per square mile. The county is the major wholesaling and jobbing center of the area, a leading medical center in the Southwest, and the economic center of the State.

Industry, Transportation, and Recreation

Lori Yost, Oklahoma Department of Transportation, and Barbara Palmer, Oklahoma Tourism and Recreation Department, helped prepare this section.

Agriculture is a leading industry in Oklahoma County. Approximately one-third of the acreage in the county is cropland or rangeland. The county has many agribusiness enterprises. Wheat, corn, alfalfa, and beef and dairy cattle are the main agricultural commodities produced in the county. Wheat is the most commonly grown crop on the cultivated land. It used for both grain and forage production. Cattle production is divided among cow-calf, stocker cattle, and dairy cattle enterprises. Most of the native range and improved pasture in the county is used by cow-calf operations. Stocker cattle graze winter pastures of wheat and other small grains. A fair amount of the acreage of these pastures is being grazed out and not harvested for grain. Several producers operate dairy farms for milk production.

Other enterprises in the county include Tinker Air Force Base (the largest enterprise in the county); the Oklahoma City Air Logistics Center; the Oklahoma State Capitol Complex; city and county governments; health care services; educational facilities, including grade schools, four vocational schools, and nine colleges and universities; Federal regulatory agencies; automobile assembly plants; tire manufacturers; television stations; telecommunication companies; the Will Rogers World Airport; and oil and gas production facilities.

Oklahoma County has 3,924 miles of roads and streets, including 94 miles of interstate highways and 94 miles of other state highways. The highways include Interstate Highways 35, 40, and 44; the Kilpatrick Turnpike and the Turner Turnpike (also Interstate Highway 44); U.S. Highways 62, 77, and 270; and Oklahoma State Highways 3, 4, 66, 74, 152, and 270.

There are three railroad lines in the county—the Atchison, Topeka, and Santa Fe Railway; the St. Louis-San Francisco Railway; and the Chicago, Rock Island, and Pacific Railway. The county has one major airport

(the Will Rogers World Airport), and several smaller airparks, three of which are the Wiley Post Airpark, the Downtown Airpark, and the Expressway Junction Airpark.

Many recreational activities can be enjoyed in Oklahoma County, which has a wide array of museums, festivals, lakes, parks, restaurants, and other attractions. Some of the museums are the National Cowboy Hall of Fame and Western Heritage Center, where memorabilia representing the culture of 17 Western States can observed; the Kirkpatrick Center Museum Complex, which includes the Red Earth Indian Center and hands-on exhibits and activities for all ages; the Fire Fighter Museum; the Softball Hall of Fame; the Oklahoma City Art Museum; and the 45th Infantry Division Museum.

The Oklahoma City Zoo is on the national top 10 list. Top thoroughbreds and quarter horses race at the Remington Park Racetrack.

Tours are offered at the State Capitol, where highlights include murals painted by Charles Wilson Banks and oil wells on the capitol lawn. Downtown, a thousand different tropical plants fill the 224-foot Myriad Botanical Gardens Crystal Bridge, which is surrounded by the Myriad Gardens, an urban oasis of waterfalls, ponds, outdoor sculpture, and native plants. Great food and entertainment are available in Bricktown, a district of restored brick warehouses directly east of downtown. The State Fair of Oklahoma, horse shows, car races, and other activities are constantly going on at the State Fair Grounds. A baseball game can be taken in at the Southwestern Bell Ballpark when the Oklahoma City Red Hawks are in town. Diamondback roller coaster rides are available at Frontier City. One can free fall 65 feet down the Big Kahuna at White Water Bay, a water amusement park.

There are opportunities for camping, fishing, boating, and mountain biking around Lake Arcadia; hiking at the Martin Park Nature Center; fishing and sail boating at Lake Hefner; and jet boat racing and waterfowl hunting at Lake Overholser. The county has numerous hunting clubs.

Physiography, Relief, and Drainage

Kenneth S. Johnson, Oklahoma Geological Survey, University of Oklahoma, Norman, Oklahoma, helped prepare this section.

Oklahoma County is in the Interior Lowlands physiographic region, the Central Lowland physiographic province, and the Osage Plain physiographic subprovince. The county has two major land resource areas (MLRAs). The eastern half of the county is in the Northern Cross Timbers MLRA (84A), and the western half is in the Central Rolling Red Prairies MLRA (80A).

The highest point in the county is about 1,410 feet above sea level. It is in the far southwest corner of the county.

Relief in Oklahoma County can be divided into four topographic areas.

The western part of the county includes uplands and flood plains and is characterized by broad, nearly level to gently sloping stream terraces with fine textured soils that formed in alluvium, very gently sloping and gently sloping hills with loamy and fine textured soils that formed in material weathered from Permian red beds, and nearly level and very gently sloping flood plains with loamy and fine textured soils that formed in alluvium of Quaternary (Pleistocene and Recent) age. The soils in this topographic area are shallow to very deep and are moderate or high in productivity. Most areas of these soils are cultivated.

The eastern part of the county includes uplands and flood plains and is characterized by very gently sloping to steep hills and entrenched drainageways with loamy, sandy, and fine textured soils that formed in material weathered from sedimentary bedrock (sandstone or shale) in colluvium or alluvium. The soils on uplands are shallow to deep and are low in productivity. Most areas of these soils support native or improved grasses or trees. The soils on flood plains are very deep and are moderate to very high in productivity. Most areas of these soils are cultivated.

The central part of the county is characterized by moderately steep soils on escarpments and nearly level soils on flood plains along the North Canadian River. These sandy to fine textured soils formed in alluvium. They are very deep and have low to very high productivity. Most areas of these soils are cultivated.

The fourth area parallels the escarpments and flood plains along the North Canadian River. This area is characterized by nearly level to moderately steep sand dunes and stream terraces. It has mainly very deep, loamy or sandy soils that formed in alluvial or eolian sediments and that range from low to high in productivity. About half of the acreage of these soils is cultivated.

Two major rivers, several major tributaries, and many smaller streams drain Oklahoma County. Deer Creek is a major tributary in the northwest part of the county. It enters the county from Canadian County and flows northward, picking up smaller streams, including Bloody Rush Creek from the west, Walnut Creek from the south, and Bluff Creek (downstream from Lake Hefner) from the south. Deer Creek then picks up Spring Creek and Dry Creek before flowing into Logan

County. Chisholm Creek, a major tributary that starts in the west-central part of Oklahoma County, also flows northward into Logan County.

The Deep Fork River starts in the west-central part of Oklahoma County and flows east for several miles before turning northeast, picking up Spring Creek from the west, and then flowing into Lake Arcadia. Flowing east from Lake Arcadia, the river then picks up Coffee Creek, a major tributary that flows southward and has picked up Cowbell Creek and Peavine Creek flowing southward out of Logan County. Continuing east, the Deep Fork River picks up Soldier Creek and Coon Creek, which flow southward out of Logan County. The Deep Fork River then turns northeast and picks up Smith Creek and Wildhorse Creek, which flow northward. Before flowing into Lincoln County, the river picks up Opossum Creek, which flows southward out of Logan County. Captain Creek drains part of northeastern Oklahoma County before it flows eastward into Lincoln County.

The North Canadian River enters the west-central part of Oklahoma County and flows into Lake Overholser, a reservoir that straddles the Canadian-Oklahoma county line. The river then flows eastward for several miles and northeast for approximately 13 miles and then follows a southeastward course until it enters Lincoln County directly south of Harrah. As the North Canadian River enters Oklahoma County from Canadian County, it picks up Mustang Creek and Campbell Creek, which flow northward and drain the southwest corner of Oklahoma County. Lightning Creek and Crooked Oak Creek, which flow northward into the North Canadian River, drain the west-central part of southern Oklahoma County. Soldier Creek flows northwest into Crutcho Creek, a major tributary that drains the south-central part of the county. Silver Creek and Choctaw Creek flow northward into the North Canadian River and drain the southeastern part of the county. Hog Creek drains the south-central and southeastern parts of the county and flows southward into Lake Thunderbird, in Cleveland County. North Deer Creek drains the southeast corner of Oklahoma County and flows eastward into Pottawatomie County.

Surface Geology

Kenneth S. Johnson, Oklahoma Geological Survey, University of Oklahoma, Norman, Oklahoma, helped prepare this section.

The surface geology of Oklahoma County is fairly simple. It is shown on the surface geology map of the county included with the soil maps in this publication. The outcropping rocks in this county consist of reddish brown sandstones and shales of Permian age. These sediments were deposited near the shores of shallow seas that once covered much of western Oklahoma (Bingham and Moore, 1975; Wood and Burton, 1968). In many parts of the county, these sedimentary rocks are mantled with unconsolidated alluvium of Quaternary age that was laid down by ancient or modern rivers and streams. Permian sandstones are major freshwater aquifers within Oklahoma. Unconsolidated alluvium near the North Canadian and Deep Fork Rivers and their tributaries also yields fresh ground water. The outcropping Permian strata overlie older sedimentary rocks that are important petroleum reservoirs in many parts of Oklahoma.

Subsurface rock units of sedimentary origin are about 8,000 feet thick in the northeastern part of the county and nearly 13,000 feet thick in the southwestern part. These strata rest upon a “basement” of granite and other igneous or metamorphic rocks that extends 20 to 25 miles down into the earth’s crust. These subsurface sedimentary rocks were deposited in the great, shallow seas that bordered the deep sedimentary basins of western Oklahoma, including the Anadarko Basin to the southwest and the Arkoma Basin to the southeast. These seas inundated the Oklahoma County area intermittently from the Cambrian Period of geologic time (about 525 million years ago) through the middle part of Permian time (about 250 million years ago). Oklahoma County is considered part of the Central Oklahoma Arch, an area that was gently uplifted in several episodes prior to Permian time. The Nemaha Uplift, a series of buried, fault-bounded uplift blocks, formed during Pennsylvanian time. It extends north-south in the subsurface beneath the western part of the county.

The outcropping rocks in Oklahoma County were deposited during the early Permian Period (about 250 to 270 million years ago). Sands, silts, and clays were eroded from marginal land areas that existed during this time in eastern Oklahoma and adjacent parts of Arkansas. These materials were transported generally to the west and northwest by streams and rivers that then flowed toward the large inland sea (the Anadarko Basin) that covered most of western Oklahoma. Oklahoma County was close to the shoreline of this ancient sea and, therefore, was the site for deposition of interbedded sandstones, siltstones, and shales laid down in alternating riverine, deltaic, tidal-flat, and shallow marine environments.

Permian rock outcrops are typically red or reddish brown with local light gray or greenish gray variations. The red color in these sedimentary rocks primarily results from the presence of iron oxide minerals (e.g., hematite), which are commonly distributed uniformly throughout the rocks. Iron oxides generally do not

occur in sedimentary rocks having grayish, greenish, or whitish colors. Soils that formed in material weathered from reddish Permian rocks tend to retain the hematite stain of the parent material. This tendency explains the red color of most of the soils in Oklahoma County.

The oldest rocks exposed in Oklahoma County crop out in the northeast corner and are successively overlain by younger Permian strata to the west and southwest. These outcropping strata dip gently to the west-southwest at an angle of less than 1 degree, as shown in the east-west geologic cross section included with the surface geology map in this publication.

The parent materials of soils are generally the product of weathering and disaggregation of outcropping rock units. As such, there is a close relationship between the physical and chemical properties of these rock formations and the soils that develop upon them. Therefore, a description of the rock units that crop out in the county can help to explain the character and distribution of soils.

The oldest rock unit exposed in Oklahoma County is the Wellington Formation. Wellington sediments in Oklahoma County consist mainly of red-brown and orange-brown sandstones and siltstones with interbeds of red-brown shale. Sandstone units in the Wellington Formation and the overlying Garber Sandstone comprise the well known Garber-Wellington aquifer. Wellington sediments are exposed only in the northeastern part of the county, where the Deep Fork River and its tributaries cut deeply through overlying strata. The Wellington Formation is about 400 to 500 feet thick in this area, although only the uppermost 200 feet is exposed in the county. Wellington landscapes are characterized by gently rolling hills that are forested with scrub oak, blackjack, and other small, slow-growing deciduous trees. Sandy soils and moderate rainfall (an average annual precipitation ranging from about 30 inches in the western part of the county to about 34 inches in the eastern part) favor this type of vegetation.

The Wellington Formation is the parent material of soils in the Stephenville-Harrah-Darsil general soil map unit. These sandy and loamy soils formed in colluvium and residuum weathered from sandstone, shale, and interbedded sandstone and shale. The soils are shallow to very deep, are well drained or excessively drained, and are in nearly level to steep areas. Soils that formed on Wellington sandstones typically are moderately permeable, whereas those that formed on shales are very slowly permeable. Minor soils on the Wellington Formation include Grainola, Littleaxe, and Newalla soils. Ashport, Easpur, Pulaski, and Tribbey soils formed in Holocene alluvium along tributaries and small streams that incise the Wellington Formation.

The Wellington Formation is conformably overlain by the Garber Sandstone, which crops out over a large portion of Oklahoma County. Garber Sandstone deposits consist primarily of orange-brown to red-brown sandstone beds irregularly interlayered with red-brown shales and siltstones. In Oklahoma County, the total thickness of the Garber Sandstone ranges from about 400 to 600 feet. The Garber outcrop area is characterized by gently rolling hills covered with prairie grasses and some woody species. The steeper slopes, drainage areas, and scattered woodlands are covered by blackjack, post oak, cedar, and elm.

The Garber Sandstone is the parent material of soils in the Stephenville-Harrah-Darsil general soil map unit and in small areas of the Littleaxe-Stephenville, Kirkland-Urban land-Renthin, Renthin-Grainola-Piedmont, and Teller-Urban land-Norge general soil map units. These loamy soils formed primarily in alluvium, colluvium, and residuum weathered from sandstone and minor amounts of shale. The soils are shallow to very deep, are well drained to excessively drained, are moderately permeable, and developed mostly on gently sloping, forested uplands and, to a lesser extent, on steep slopes.

The Hennessey Group conformably overlies the Garber Sandstone and has an outcrop area that is characterized by nearly level to gently sloping, grass-covered prairies. This prairie landscape is largely barren of trees, except for areas along intermittent streams where precipitation runoff is concentrated. The Hennessey Formation, which crops out in about 25 percent of the county, consists mainly of reddish brown shale with some interbeds of siltstone and fine grained sandstone. The total thickness of the Hennessey sediments in Oklahoma County is about 400 feet.

The Hennessey Group is the parent material of soils in the Kirkland-Urban land-Renthin and Renthin-Granola-Piedmont general soil map units and in small areas of the Teller-Urban land-Norge general soil map unit. These clayey soils formed mainly in alluvium and residuum weathered from a shale section that may have minor sandstone interbeds. The soils are moderately deep to very deep and are well drained. They generally are nearly level to sloping but are steep in a few areas. Soils that formed on Hennessey Group shales typically are very slowly permeable.

The Duncan Sandstone conformably overlies Hennessey shales and is the youngest Permian formation in Oklahoma County. Duncan Sandstone outcrops are restricted to about 3 square miles in the southwest corner of the county, where only the lower

50 feet of the formation is exposed. The Duncan section consists mainly of red-brown shales and siltstones interbedded with orange-brown sandstones.

The Duncan Sandstone is the parent material of soils in the Renthin-Grainola-Piedmont general soil map unit. These soils formed mainly in alluvium and residuum weathered from shale and sandstone. They are moderately deep or deep, are well drained, and are on gently sloping prairie uplands.

Alluvial and terrace deposits of Quaternary age in Oklahoma County are generally 10 to 75 feet thick and consist mainly of sand, silt, and clay interbeds with few gravel lenses. These sediments were eroded from Permian strata within and to the west of Oklahoma County and also from other rock units that are west and northwest of the county and are within the North Canadian River drainage basin. Small areas within the Cimarron River drainage basin (Cottonwood Creek and its tributaries) are in the northwestern part of the county, and a small area of Canadian River tributaries is in the extreme southwest part. Quaternary sediments, all deposited within the past million years or so, were laid down mainly as flood plain or alluvial deposits along the major rivers and streams flowing predominantly to the southeast, east, and northeast across the county. The wind has blown some of the sands and silts into dunes.

Terrace deposits, which consist of older alluvium left behind after a river shifts position or cuts more deeply into underlying material, occur as either broad and level or hummocky and undulating expanses that are topographically higher than, and generally adjacent to, the present-day flood plains. They occur mainly within 5 miles of the flood plain along the North Canadian River but also are in smaller areas near any of the other streams.

Terrace deposits are the parent material of soils in the Kirkland-Urban land-Renthin, Konawa-Derby-Urban land, and Stephenville-Harrah-Darsil general soil map units and in small areas of the Teller-Urban land-Norge and Littleaxe-Stephenville general soil map units. These loamy and sandy soils formed in Quaternary alluvial and windblown sediments. They typically are moderately deep to very deep, are well drained to excessively drained, and are on nearly level to moderately rolling uplands and terraces. Because of the unconsolidated, sandy nature of the parent material, these soils commonly are moderately permeable or more permeable.

Alluvial deposits are the unconsolidated sediments in the stream channels or flood plains of modern-day rivers and streams, such as the main stem and tributaries of the North Canadian and Deep Fork Rivers. North Canadian River alluvium is the parent material of soils in the Dale-Keokuk-Asher and Yahola-Gracemont-Gaddy general soil map units and in a small area of the Teller-Urban land-Norge general soil map unit. Quaternary sediments along the Deep Fork River, Deer Creek, Chisholm Creek, and their tributaries are the parent material of soils in the Ashport-Miller general soil map unit. Soils that formed in Quaternary alluvium typically are very deep, are somewhat excessively drained to somewhat poorly drained, and are on nearly level surfaces developed on modern flood plains. The soils are sandy, loamy, and clayey in various areas. The sandy soils typically are permeable, and the clayey soils are characterized by restricted permeability.

The mineral and water resources of Oklahoma County are important to the overall development and progress of the county. Petroleum production is by far the most important mineral activity. In 1995, the petroleum production in the county amounted to about 2.8 million barrels of crude oil (valued at $46.4 million) and about 20.5 billion cubic feet of natural gas (valued at $29.5 million). Because of these production levels, Oklahoma County ranks as one of the more important petroleum-producing counties in the State. Sand and gravel have been excavated from a number of alluvial and terrace deposits in the county, and some of the sandstone and siltstone beds may locally be suitable for use as building and fill material. Permian shales and clays have been mined and used for many years in the manufacture of bricks and clay-tile products. Near the town of Choctaw, clayey alluvium has been mined for use in manufacturing lightweight aggregate for the construction industry.

Abundant quantities of good-quality ground water are available in the Quaternary alluvial and terrace deposits and in the extremely important Garber-Wellington aquifer, which underlies all parts of the county. The Garber-Wellington aquifer covers permeable sandstone layers of both the entire Garber Sandstone section and the upper part of the underlying Wellington Formation. When saturated, this aquifer ranges from about 500 to 700 feet in thickness.

Water wells completed in the Garber-Wellington aquifer commonly yield 150 to 300 gallons per minute (GPM) of fresh water, and some wells yield as much as 400 GPM. Most of the water drawn from the Garber-Wellington aquifer contains only 200 to 500 milligrams per liter (mg/L) of dissolved solids, although some of the water has a maximum of 1,000 mg/L. The aquifer is recharged by precipitation and runoff that percolates down through the soil into the porous and permeable sandstones of the Garber and Wellington Formations. This ground water then seeps slowly downward and/or laterally in a downdip direction to the

west within the sandstone layers. The aquifer water is salty in the lower part of the Wellington Formation and in areas farther west where the Garber Sandstone extends beneath Canadian County. (See the east-west cross section included with the surface geology map in this publication.) Where the Garber or Wellington Formation crops out, ground water generally can be encountered in any permeable sandstone bed at or below the ground-water surface. Farther west, where the relatively impermeable Hennessey Group overlies Garber Sandstone, wells still must be drilled down into the water-bearing sands of the Garber-Wellington aquifer. When it encounters freshwater sand, the water is forced up the drill hole several hundred feet under artesian pressure to the potentiometric surface, approximately 100 to 200 feet below the land surface.

Water wells in alluvial and terrace deposits commonly yield 25 to 300 GPM. Most alluvial aquifers yield water that has 300 to 1,000 mg/L of dissolved solids, whereas aquifers in terrace deposits yield water that typically has 200 to 400 mg/L of dissolved solids.

Climate

Prepared by the National Water and Climate Center, Natural Resources Conservation Service, Portland, Oregon.

The table “Temperature and Precipitation” gives data on temperature and precipitation for the survey area as recorded at Oklahoma City in the period 1961 to 1990. The table “Freeze Dates in Spring and Fall” shows probable dates of the first freeze in fall and the last freeze in spring. The table “Growing Season” provides data on the length of the growing season.

In winter, the average temperature is 38.6 degrees F and the average daily minimum temperature is 27.8 degrees. The lowest temperature on record, which occurred at Oklahoma City on December 23, 1989, was -8 degrees. In summer, the average temperature is 80.0 degrees and the average daily maximum temperature is 91.1 degrees. The highest temperature, which occurred at Oklahoma City on July 6, 1996, was 110 degrees.

Growing degree days are shown in the table “Temperature and Precipitation.” They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The average annual precipitation is about 33.35 inches. Of this, about 24.6 inches, or 74 percent, usually falls in April through October. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 7.53 inches at Oklahoma City on September 22, 1970. Thunderstorms occur on about 50 days each year, and most occur between May and August.

The average seasonal snowfall is 9.1 inches. The greatest snow depth at any one time during the period of record was 12 inches on January 7, 1988. On the average, 8 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 8.4 inches on March 10, 1948.

The average relative humidity in midafternoon is about 52 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 78 percent of the time possible in summer and 60 percent in winter. The prevailing wind is from the south. Average windspeed is highest, about 14 miles per hour, in March and April.

Temperature and Precipitation

(Recorded in the period 1961-90 at Oklahoma City, Oklahoma)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	^oF	^oF	^oF	^oF	^oF	*Units*	*In*	*In*	*In*		*In*
January-----	46.5	25.1	35.8	74	0	12	1.13	0.37	1.89	2	2.8
February----	51.9	29.6	40.8	79	5	35	1.56	0.57	2.39	3	2.7
March-------	62.0	38.6	50.3	86	15	133	2.71	1.15	4.03	4	1.2
April-------	72.1	49.0	60.6	91	28	331	2.77	1.31	4.03	4	0.0
May---------	79.2	57.7	68.5	95	40	572	5.22	2.42	7.64	6	0.0
June--------	87.4	66.2	76.8	99	52	803	4.31	2.01	6.28	5	0.0
July--------	93.4	70.8	82.1	105	59	995	2.61	1.05	4.08	4	0.0
August------	92.4	69.6	81.0	105	57	961	2.60	1.24	3.78	4	0.0
September---	83.8	62.2	73.0	100	41	690	3.84	1.68	5.67	5	0.0
October-----	73.6	50.5	62.1	92	32	383	3.23	1.20	4.93	4	0.0
November----	60.3	38.7	49.5	81	18	113	1.98	0.53	3.14	3	0.6
December----	49.7	28.6	39.2	74	4	20	1.40	0.44	2.17	2	1.8
Yearly:											
Average---	71.0	48.9	60.0	---	---	---	---	---	---	---	---
Extreme---	110	-8	---	107	-2	---	---	---	---	---	---
Total-----	---	---	---	---	---	5,048	33.35	27.18	39.22	46	9.1

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minumum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Oklahoma City, Oklahoma)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than-----	March 29	April 7	April 11
2 years in 10 later than-----	March 22	April 1	April 7
5 years in 10 later than-----	March 8	March 21	March 31
First freezing temperature in fall:			
1 year in 10 earlier than---	November 11	November 1	October 20
2 years in 10 earlier than---	November 17	November 6	October 25
5 years in 10 earlier than---	November 30	November 15	November 3

Growing Season

(Recorded in the period 1961-90 at Oklahoma City, Oklahoma)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	*Days*	*Days*
9 years in 10	237	218	197
8 years in 10	247	225	204
5 years in 10	266	238	217
2 years in 10	286	252	230
1 year in 10	296	259	237

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one unit can occur in another but in a different pattern.

The general soil map is part of the State Soil Geographic Data Base (STATSGO). It is at a scale of 1 to 250,000. It should not be used to locate soils for intensive land uses, such as determining the suitability for house lots. It is useful for understanding the soil resource and for planning broad land uses in a State or region. The component composition of a STATSGO map unit does not statistically represent a subset (county) or any one portion of the whole STATSGO map unit. A STATSGO map unit may have up to 21 named components, but any one particular area within the STATSGO map unit may not consist of all named components or the components of the entire STATSGO map unit.

The general soil map in this publication reflects the STATSGO composition of the county subset. The subset name of a general soil map unit may vary from county to county, but it is within the parameters of the entire STATSGO map unit. In the legend for the general soil map, the STATSGO map unit name is listed first and the county general soil map unit name is listed (in parentheses) directly below the STATSGO name. The STATSGO reference number (which consists of the letters “OK” followed by a three-digit number) precedes the STATSGO name.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. OK077—Dale-Brewer-Reinach (Dale-Keokuk-Asher)

Very deep, well drained and moderately well drained, loamy soils on flood plains

Setting

Location in the survey area: High flood plains along the Canadian River
Primary landscape: Valleys
Slope: 0 to 1 percent

Composition

Extent of the unit in the survey area: 4 percent of the area
Extent of the components in the unit:
Dale soils—33 percent
Keokuk soils—19 percent
Asher soils—19 percent
Minor components—29 percent (Amber, Canadian, Lomill, and Watonga soils and Urban land)

Soil Characteristics

Dale

Surface layer: Grayish brown and very dark grayish brown silt loam
Subsoil: Brown silt loam
Substratum: Light brown silt loam and pink, stratified silt loam, very fine sandy loam, and fine sandy loam
Depth class: Very deep
Drainage class: Well drained
Seasonal high water table: None
Major landform: High flood plains
Slope: 0 to 1 percent
Parent material: Loamy alluvium

Keokuk

Surface layer: Grayish brown and dark grayish brown very fine sandy loam
Subsoil: Brown loam
Substratum: Brown, light brown, and pink very fine sandy loam

Underlying material: Dark gray silty clay loam and silty clay
Depth class: Very deep
Drainage class: Well drained
Seasonal high water table: None
Major landform: High flood plains
Slope: 0 to 1 percent
Parent material: Loamy and sandy alluvium

Asher

Surface layer: Grayish brown and dark grayish brown silty clay loam
Subsoil: Dark brown and brown silty clay loam
Substratum: Light brown silt loam and pink, stratified very fine sandy loam and silt loam
Underlying material: Brown silty clay
Depth class: Very deep
Drainage class: Moderately well drained
Seasonal high water table: None
Major landform: High flood plains
Slope: 0 to 1 percent
Parent material: Loamy alluvium

Use and Management

Uses: Cropland, hayland, pasture, rangeland, and urban development

Cropland
Suitability: Dale—well suited; Keokuk—suited; Asher—well suited
Management concerns: Flooding, tilth, and fertility

Rangeland
Suitability: Dale—suited; Keokuk—suited; Asher—suited
Management concerns: Weed control, tilth, fertility, and rotational grazing

Pasture and hayland
Suitability: Dale—well suited; Keokuk—well suited; Asher—well suited
Management concerns: Tilth, fertility, and flooding

Urban development
Suitability: Dale—poorly suited; Keokuk—poorly suited; Asher—poorly suited
Management concerns: Flooding, seepage, and restricted permeability

2. OK078—Dale-Canadian-Gracemore (Yahola-Gracemont-Gaddy)

Very deep, well drained, somewhat excessively drained and poorly drained, sandy and loamy soils on flood plains

Setting

Location in the survey area: Low flood plains along the Canadian River
Primary landscape: Valleys
Slope: 0 to 1 percent

Composition

Extent of the unit in the survey area: 4 percent of the area
Extent of the components in the unit:
Yahola soils—43 percent
Gracemont soils—12 percent
Gaddy soils—11 percent
Minor components—34 percent (Canadian, Gracemore, Keokuk, Latrass, and Lomill soils, Urban land, and Water)

Soil Characteristics

Yahola

Surface layer: Brown fine sandy loam
Substratum: Stratified light brown fine sandy loam, brown very fine sandy loam, and brown silt loam and stratified reddish yellow fine sandy loam, loamy fine sand, and loamy very fine sand
Depth class: Very deep
Drainage class: Well drained
Seasonal high water table: None
Major landform: Low flood plains
Slope: 0 to 1 percent
Parent material: Calcareous, loamy alluvium

Gracemont

Surface layer: Brown fine sandy loam
Substratum: Light brown fine sandy loam, brown silt loam, light brown very fine sandy loam, light reddish brown loamy very fine sand, and stratified pink fine sand, light reddish brown loamy fine sand, and light reddish brown loamy very fine sand
Depth class: Very deep
Drainage class: Poorly drained
Seasonal high water table: November to May
Major landform: Low flood plains
Slope: 0 to 1 percent
Parent material: Calcareous, sandy and loamy alluvium

Gaddy

Surface layer: Yellowish brown loamy fine sand
Substratum: Light yellowish brown and very pale brown fine sand
Depth class: Very deep
Drainage class: Somewhat excessively drained

Seasonal high water table: None
Major landform: Low flood plains
Slope: 0 to 1 percent
Parent material: Sandy alluvium

Use and Management

Uses: Cropland, hayland, pasture, rangeland, and urban development

Cropland
Suitability: Yahola—suited; Gracemont—poorly suited; Gaddy—poorly suited
Management concerns: Flooding, fertility, hazard of erosion, available water capacity, and content of organic matter

Rangeland
Suitability: Yahola—suited; Gracemont—suited; Gaddy—suited
Management concerns: Flooding, content of organic matter, hazard of erosion, controlled grazing, and drainage

Pasture and hayland
Suitability: Yahola—well suited; Gracemont—well suited; Gaddy—suited
Management concerns: Flooding, fertility, content of organic matter, and hazard of erosion

Urban development
Suitability: Yahola—poorly suited; Gracemont—poorly suited; Gaddy—poorly suited
Management concerns: Flooding, droughtiness, caving of cutbanks, seepage, and high water table

3. OK094—Kirkland-Renfrow-Zaneis (Kirkland-Urban Land-Renthin)

Areas of very deep and deep, well drained, clayey soils and areas of Urban land; on prairie uplands (fig. 2)

Setting

Location in the survey area: The western half of the county
Primary landscape: Uplands
Slope: 0 to 5 percent

Composition

Extent of the unit in the survey area: 14 percent of the area
Extent of the components in the unit:
Kirkland soils—26 percent
Urban land—25 percent
Renthin soils—19 percent
Minor components—30 percent (Ashport, Bethany, Coyle, Grainola, Harrah, Ironmound, Kingfisher, Lawrie, Norge, Piedmont, and Renfrow soils)

Soil Characteristics

Kirkland

Surface layer: Dark grayish brown and grayish brown silt loam
Subsoil: Very dark grayish brown, dark grayish brown, and brown silty clay and grayish brown, strong brown, and reddish yellow clay loam
Depth class: Very deep
Drainage class: Well drained
Seasonal high water table: None
Major landform: Uplands hills or upland terraces
Slope: 0 to 1 percent
Parent material: A clayey mantle over shale

Urban land

Surface layer: Various textures; covered by streets, parking lots, buildings, and other structures
Slope: 1 to 5 percent
Runoff rate: High

Renthin

Surface layer: Dark brown silt loam
Subsoil: Dark brown clay loam and reddish brown and red clay
Bedrock: Reddish brown and red shale
Depth class: Deep
Drainage class: Well drained
Seasonal high water table: None
Major landform: Upland hills
Slope: 1 to 3 percent
Parent material: Shale residuum

Use and Management

Uses: Cropland, pasture, hayland, rangeland, and urban development

Cropland
Suitability: Kirkland—well suited; Urban land—not suited; Renthin—suited
Management concerns: A clayey subsoil, hazard of erosion, and very slow permeability

Rangeland
Suitability: Kirkland—suited; Urban land—not suited; Renthin—suited
Management concerns: A clayey subsoil, weed control, and rotational grazing

Pasture and hayland
Suitability: Kirkland—suited; Urban land—not suited; Renthin—suited

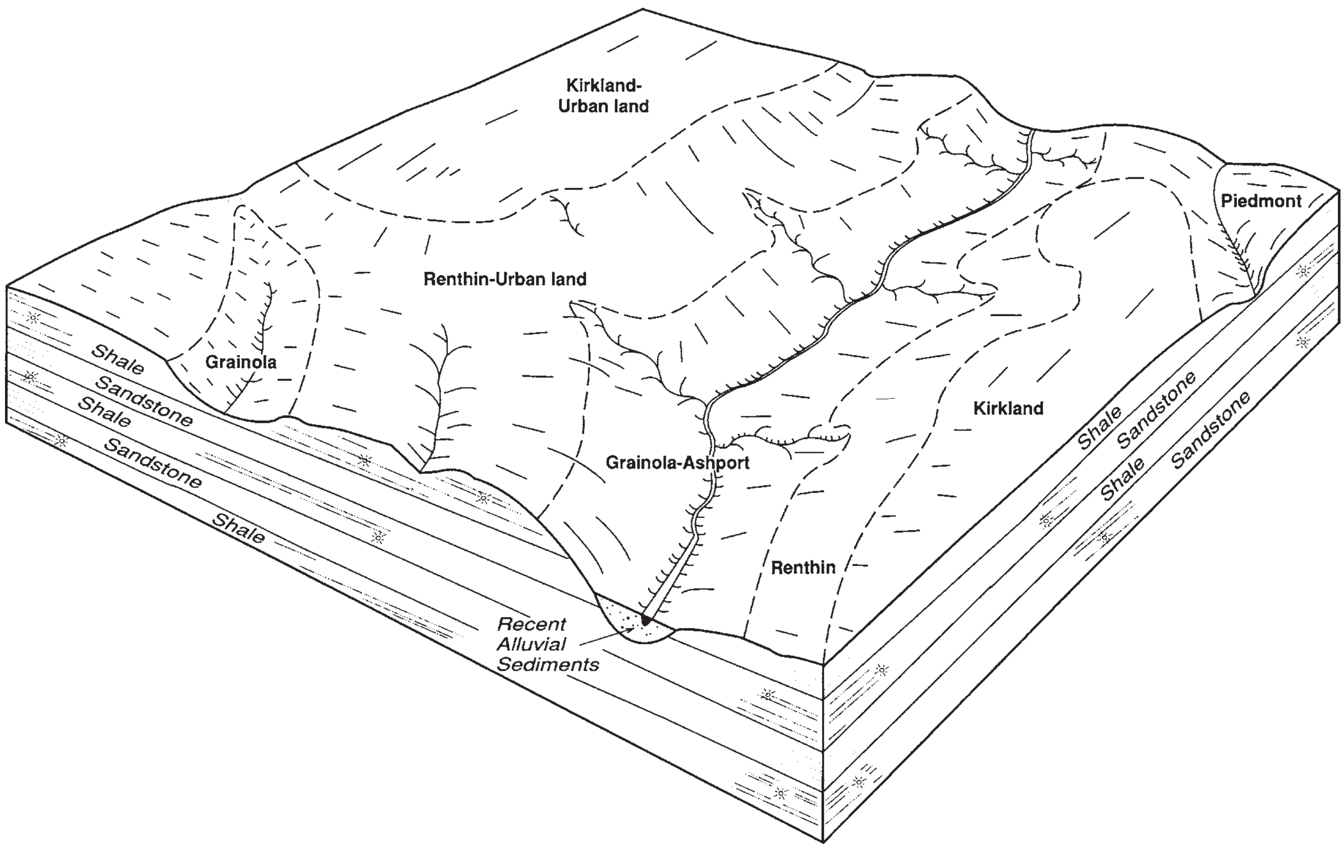

Figure 2.—Typical pattern of soils and underlying material in the Kirkland-Urban land-Renthin general soil map unit.

Management concerns: A clayey subsoil, weed control, rotational grazing, and soil tilth

Urban development

Suitability: Kirkland—poorly suited; Urban land—suited; Renthin—poorly suited

Management concerns: A high shrink-swell potential, very slow permeability, high corrosivity to steel, hazard of erosion, and a clayey subsoil

4. OK112—Port-Pulaski-Ashport (Ashport-Miller)

Very deep, well drained and moderately well drained, loamy and clayey soils on flood plains (fig. 3)

Setting

Location in the survey area: Low flood plains along minor streams in the northwest part of the county

Primary landscape: Valleys

Slope: 0 to 1 percent

Composition

Extent of the unit in the survey area: 5 percent of the area

Extent of the components in the unit:

Ashport soils—39 percent

Miller soils—23 percent

Minor components—38 percent (Easpur, Hibsaw, Lawrie, Lomill, Pulaski, and Tribbey soils)

Soil Characteristics

Ashport

Surface layer: Reddish brown silt loam

Subsoil: Reddish brown silt loam

Substratum: Stratified reddish brown silt loam and brown very fine sandy loam

Underlying material: Reddish brown silt loam

Depth class: Very deep

Drainage class: Well drained

Seasonal high water table: None

Major landform: Low flood plains

Slope: 0 to 1 percent

Parent material: Loamy alluvium

Miller

Surface layer: Reddish brown silty clay
Subsoil: Reddish brown silty clay
Substratum: Reddish brown silty clay
Underlying material: Dark brown silty clay loam
Depth class: Very deep
Drainage class: Moderately well drained
Seasonal high water table: None
Major landform: Low flood plains
Slope: 0 to 1 percent
Parent material: Clayey alluvium

Use and Management

Uses: Cropland, hayland, pasture, rangeland, and urban development

Cropland
Suitability: Ashport—well suited; Miller—suited
Management concerns: Flooding, tilth, permeability, and fertility

Rangeland
Suitability: Ashport—suited; Miller—suited
Management concerns: Flooding, tilth, and controlled grazing

Pasture and hayland
Suitability: Ashport—well suited; Miller—suited
Management concerns: Flooding, fertility, hazard of erosion, and tilth

Urban development
Suitability: Ashport—poorly suited; Miller—poorly suited
Management concerns: Flooding, low strength, the shrink-swell potential, and restricted permeability

5. OK116—Renfrow-Kirkland-Grainola (Renthin-Grainola-Piedmont)

Deep and moderately deep, well drained, clayey soils on prairie uplands (fig. 4)

Setting

Location in the survey area: Northwestern part of the county

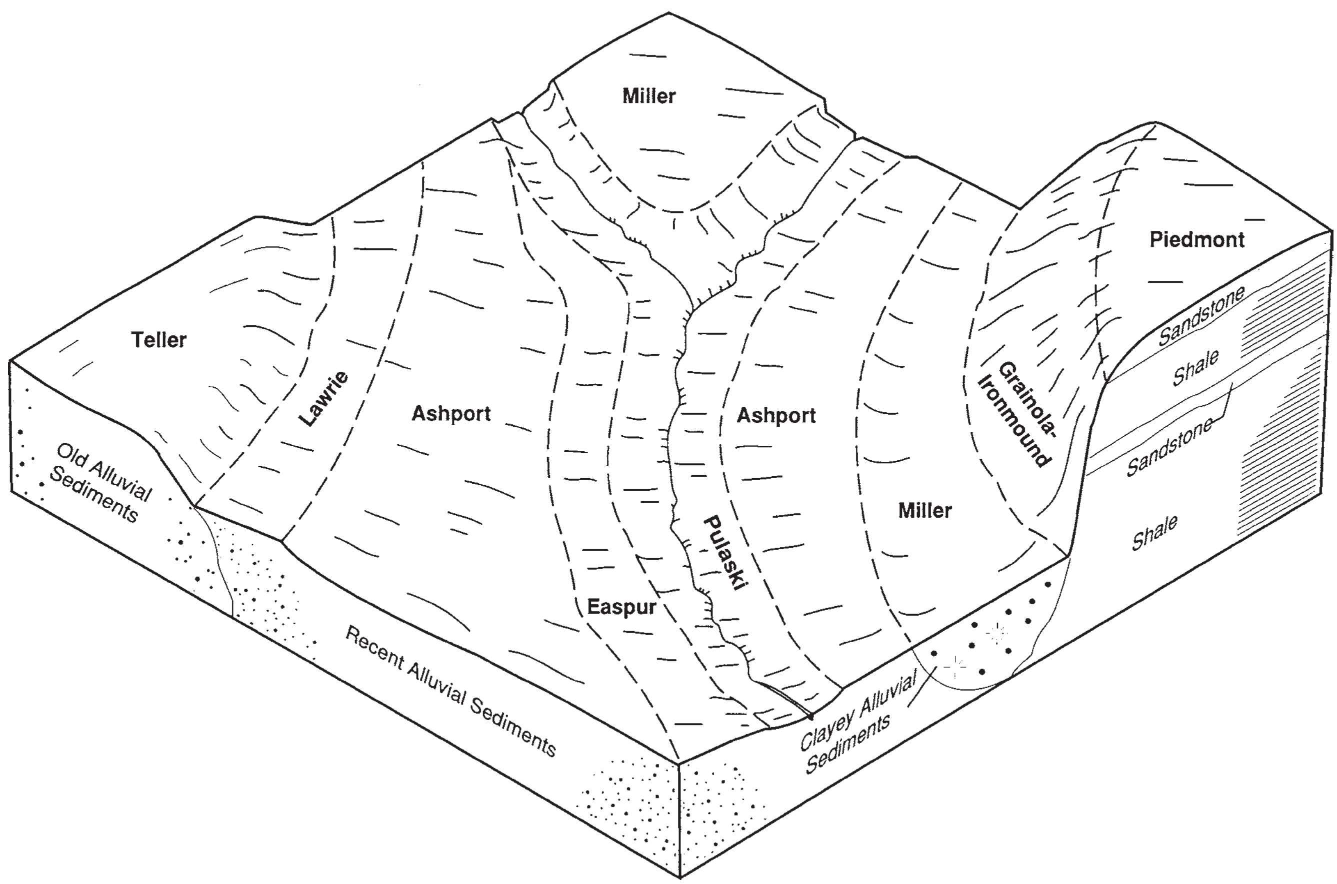

Figure 3.—Typical pattern of soils and underlying material in the Ashport-Miller general soil map unit.

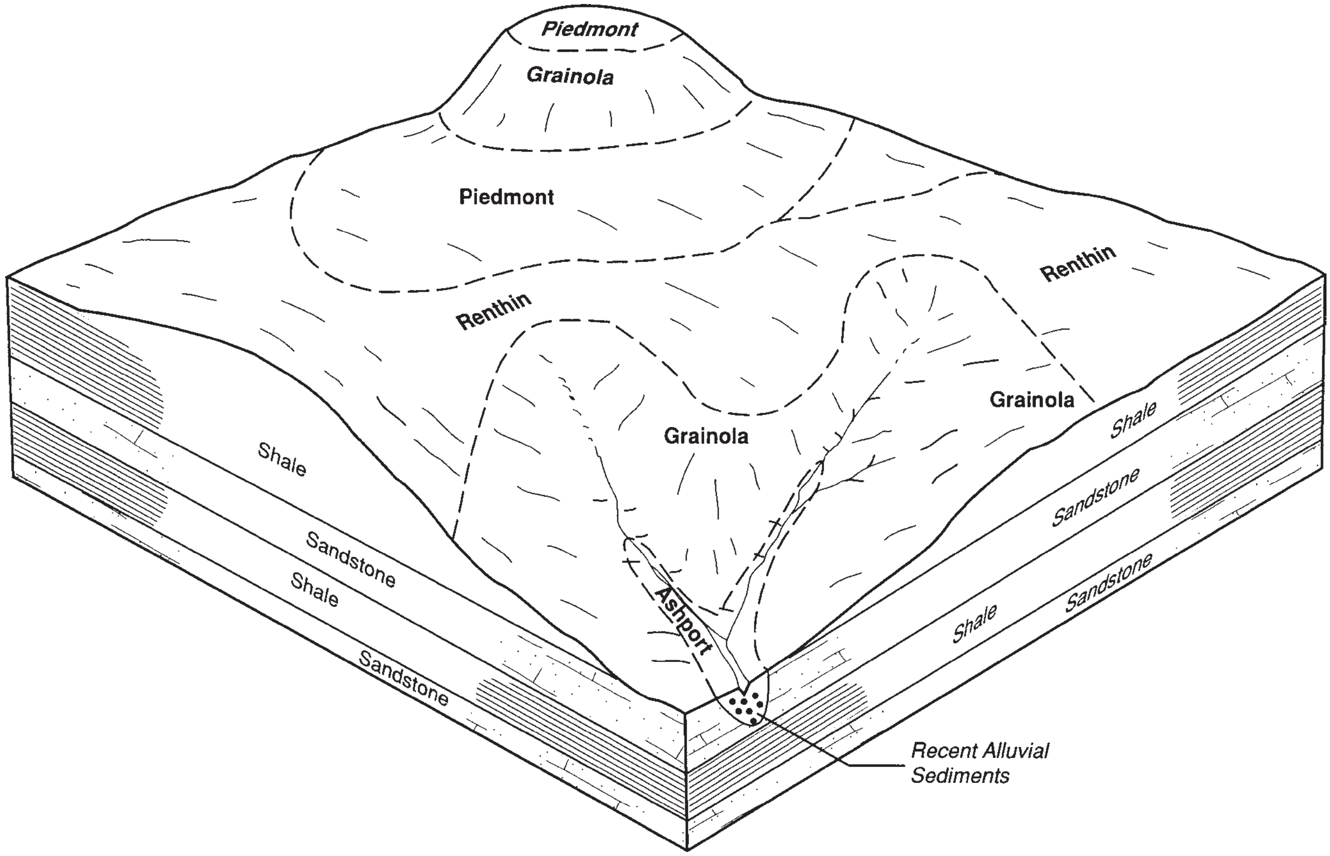

Figure 4.—Typical pattern of soils and underlying material in the Renthin-Grainola-Piedmont general soil map unit.

Primary landscape: Uplands
Slope: 1 to 8 percent

Composition

Extent of the unit in the survey area: 14 percent of the area
Extent of the components in the unit:
Renthin soils—42 percent
Grainola soils—18 percent
Piedmont soils—14 percent
Minor components—26 percent (Ashport, Bethany, Coyle, Grant, Huska, Ironmound, Kingfisher, Kirkland, Lawrie, Miller, Norge, Renfrow, Teller, and Teval soils, Pits, and Urban land)

Soil Characteristics

Renthin

Surface layer: Dark brown silty clay loam
Subsoil: Dark reddish gray silty clay loam and reddish brown silty clay
Bedrock: Red shale
Depth class: Deep
Drainage class: Well drained
Seasonal high water table: None
Major landform: Upland hills
Slope: 3 to 5 percent
Parent material: Shale residuum

Grainola

Surface layer: Dark brown silty clay loam
Subsoil: Reddish brown silty clay loam and red silty clay
Bedrock: Red shale
Depth class: Moderately deep
Drainage class: Well drained
Seasonal high water table: None
Major landform: Upland hills
Slope: 5 to 8 percent
Parent material: Shale residuum

Piedmont

Surface layer: Dark brown silt loam
Subsoil: Reddish brown silty clay loam and silty clay
Bedrock: Reddish brown shale
Depth class: Moderately deep
Drainage class: Well drained

Seasonal high water table: None
Major landform: Upland hills
Slope: 1 to 3 percent
Parent material: Shale residuum

Use and Management

Uses: Cropland, hayland, pasture, rangeland, and urban development

Cropland
Suitability: Renthin—suited; Grainola—poorly suited; Piedmont—suited
Management concerns: Very slow permeability, hazard of erosion, and a clayey subsoil

Rangeland
Suitability: Renthin—suited; Grainola—suited; Piedmont—suited
Management concerns: Weed control, rotational grazing, timely deferment of grazing, and a clayey subsoil

Pasture and hayland
Suitability: Renthin—suited; Grainola—poorly suited; Piedmont—suited
Management concerns: Weed control, a clayey subsoil, fertility, and rotational grazing

Urban development
Suitability: Renthin—poorly suited; Grainola—poorly suited; Piedmont—poorly suited
Management concerns: A high shrink-swell potential, very slow permeability, depth to bedrock, high corrosivity, and hazard of erosion

6. OK121—Teller-Konawa-Norge (Teller-Urban Land-Norge)

Areas of very deep, well drained, loamy soils and areas of Urban land; on terraces

Setting

Location in the survey area: Along the North Canadian River
Primary landscape: Upland terraces
Slope: 1 to 8 percent

Composition

Extent of the unit in the survey area: 6 percent of the area
Extent of the components in the unit:
Teller soils—38 percent
Urban land—34 percent
Norge soils—12 percent
Minor components—16 percent (Lawrie, Stephenville, Renthin, Vanoss, and Zaneis soils, Pits, and Water)

Soil Characteristics

Teller

Surface layer: Dark brown fine sandy loam
Subsoil: Reddish brown sandy loam and sandy clay loam, yellowish red sandy clay loam, and reddish yellow very fine sandy loam
Substratum: Reddish yellow very fine sandy loam
Depth class: Very deep
Drainage class: Well drained
Seasonal high water table: None
Major landform: Stream terraces
Slope: 1 to 3 percent
Parent material: Loamy alluvium

Urban land

Surface layer: Various textures; covered by streets, parking lots, buildings, and other structures
Depth class: Variable
Slope: 1 to 8 percent
Runoff rate: High

Norge

Surface layer: Dark brown silt loam
Subsoil: Reddish brown, yellowish red, red, and light red silty clay loam
Depth class: Very deep
Drainage class: Well drained
Seasonal high water table: None
Major landform: Upland terraces
Slope: 1 to 5 percent
Parent material: Loamy alluvium

Use and Management

Uses: Cropland, hayland, pasture, rangeland, and urban development

Cropland
Suitability: Teller—well suited; Urban land—not suited; Norge—well suited
Management concerns: Hazard of erosion and slope

Rangeland
Suitability: Teller—suited; Urban land—not suited; Norge—suited
Management concerns: Weed control, rotational grazing, and hazard of erosion

Pasture and hayland
Suitability: Teller—well suited; Urban land—not suited; Norge—well suited
Management concerns: Weed control, fertility, and hazard of erosion

Urban development
Suitability: Teller—well suited; Urban land—suited; Norge—suited
Management concerns: Seepage, slope, and the shrink-swell potential

7. OK146—Konawa-Eufaula-Dougherty (Konawa-Derby-Urban Land)

Areas of very deep, well drained and somewhat excessively drained, loamy and sandy soils and areas of Urban land; on terraces

Setting

Location in the survey area: Along the North Canadian River
Primary landscape: Upland terraces and dunes
Slope: 0 to 15 percent

Composition

Extent of the unit in the survey area: 4 percent of the area
Extent of the components in the unit:
Konawa soils—55 percent
Derby soils—17 percent
Urban land—13 percent
Minor components—15 percent (Darsil, Dougherty, Harrah, Newalla, Stephenville, Teller, and Tribbey soils)

Soil Characteristics

Konawa

Surface layer: Brown fine sandy loam
Subsoil: Red sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Seasonal high water table: None
Major landform: Upland terraces
Slope: 3 to 8 percent
Parent material: Sandy and loamy stream terrace sediments

Derby

Surface layer: Brown loamy fine sand
Subsurface layer: Yellow loamy fine sand
Subsoil: Yellow, pink, and pinkish gray loamy fine sand with thin bands of reddish yellow fine sandy loam
Depth class: Very deep
Drainage class: Somewhat excessively drained
Seasonal high water table: None
Major landform: Dunes
Slope: 0 to 15 percent
Parent material: Sandy eolian sediments

Urban land

Surface layer: Various textures; covered by streets, parking lots, buildings, and other structures
Depth class: Variable
Slope: 0 to 15 percent
Runoff rate: High

Use and Management

Uses: Cropland, hayland, pasture, rangeland, and urban development

Cropland
Suitability: Konawa—suited; Derby—poorly suited; Urban land—not suited
Management concerns: Hazard of erosion, low content of organic matter, fertility, runoff, and low available water capacity

Rangeland
Suitability: Konawa—suited; Derby—suited; Urban land—not suited
Management concerns: Weed control, brush control, rotational grazing, and hazard of erosion

Pasture and hayland
Suitability: Konawa—suited; Derby—poorly suited; Urban land—not suited
Management concerns: Hazard of erosion, low content of organic matter, fertility, and low available water capacity

Urban development
Suitability: Konawa—well suited; Derby—suited; Urban land—suited
Management concerns: Slope, seepage, droughtiness, restricted permeability, and rapid permeability

8. OK151—Stephenville-Darnell-Newalla (Stephenville-Harrah-Darsil)

Very deep, moderately deep, and shallow, well drained and excessively drained, loamy and sandy soils on forested uplands (fig. 5)

Setting

Location in the survey area: The eastern half of the county
Primary landscape: Uplands
Slope: 3 to 8 percent

Composition

Extent of the unit in the survey area: 42 percent of the area
Extent of the components in the unit:
Stephenville soils—36 percent

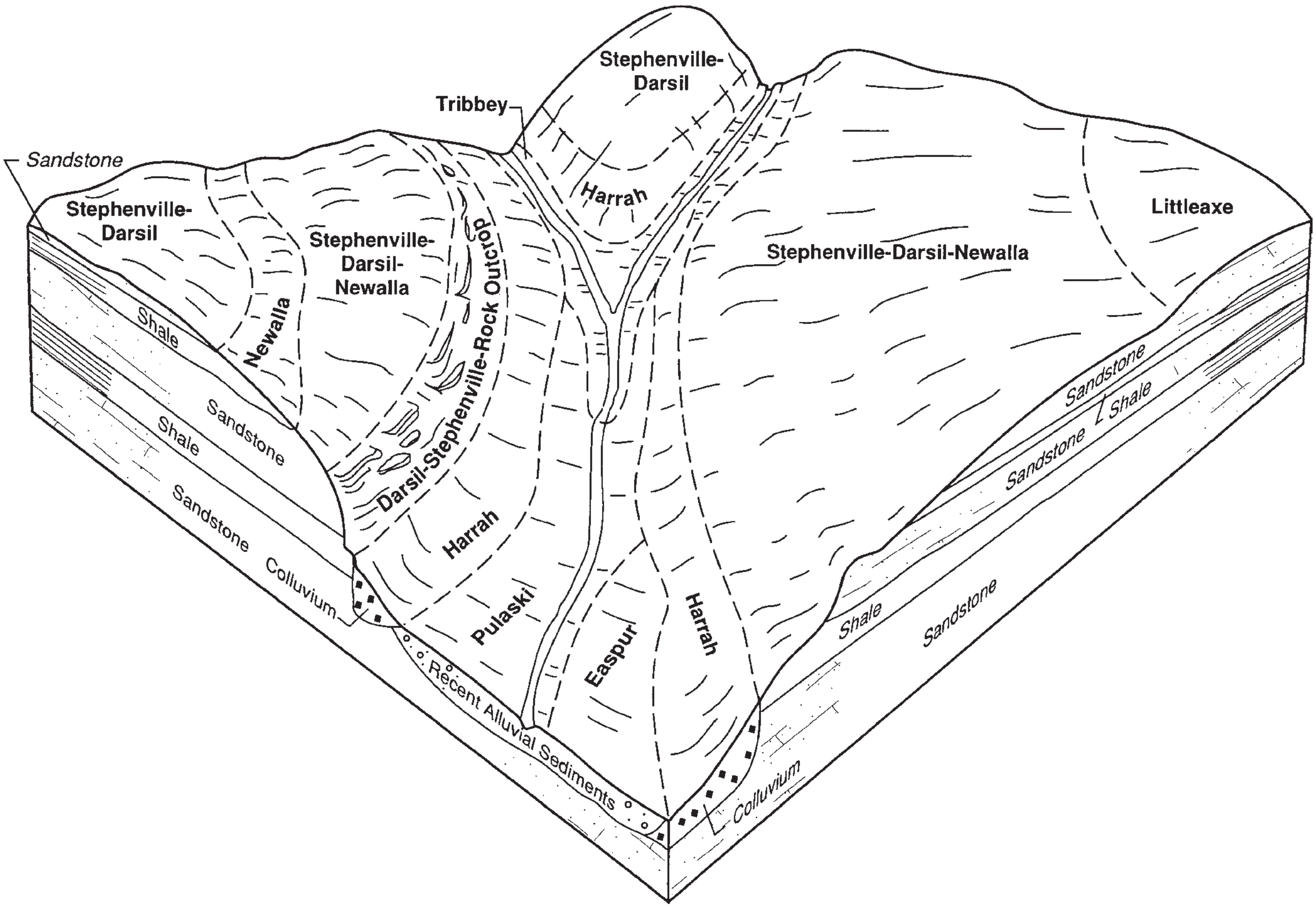

Figure 5.—Typical pattern of soils and underlying material in the Stephenville-Harrah-Darsil general soil map unit.

Harrah soils—24 percent
Darsil soils—15 percent
Minor components—25 percent (Ashport, Derby, Easpur, Grainola, Littleaxe, Newalla, Pulaski, and Tribbey soils, Rock outcrop, and Urban land)

Soil Characteristics

Stephenville

Surface layer: Brown fine sandy loam
Subsurface layer: Light reddish brown loamy fine sand
Subsoil: Red sandy clay loam
Bedrock: Reddish brown and red sandstone
Depth class: Moderately deep
Drainage class: Well drained
Seasonal high water table: None
Major landform: Upland hills
Slope: 3 to 8 percent
Parent material: Sandstone residuum

Harrah

Surface layer: Brown fine sandy loam
Subsurface layer: Brown fine sandy loam and light brown loamy fine sand
Subsoil: Yellowish red, reddish yellow, and reddish brown sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Seasonal high water table: None
Major landform: Uplands hills
Slope: 3 to 5 percent
Parent material: Sandy and loamy colluvial material weathered from sandstone

Darsil

Surface layer: Brown loamy fine sand
Subsurface layer: Light reddish brown loamy fine sand

Bedrock: Reddish brown, weathered sandstone
Depth class: Shallow
Drainage class: Excessively drained
Seasonal high water table: None
Major landform: Upland hills
Slope: 3 to 8 percent
Parent material: Material weathered from weakly cemented sandstone

Use and Management

Uses: Cropland, hayland, pasture, rangeland, and urban development

Cropland
Suitability: Stephenville—suited; Harrah—suited; Darsil—poorly suited
Management concerns: Low content of organic matter, low available water capacity, fertility, hazard of erosion, and slope

Rangeland
Suitability: Stephenville—suited; Harrah—suited; Darsil—suited
Management concerns: Fertility, low available water capacity, low content of organic matter, rotational grazing, and proper stocking rates

Pasture and hayland
Suitability: Stephenville—suited; Harrah—well suited; Darsil—poorly suited
Management concerns: Fertility, low available water capacity, and low content of organic matter

Urban development
Suitability: Stephenville—suited; Harrah—well suited; Darsil—poorly suited
Management concerns: Depth to bedrock and slope

9. OK225—Coyle-Ironmound-Zaneis (Zaneis-Renthin)

Deep, well drained, loamy and clayey soils on prairie uplands

Setting

Location in the survey area: The north-central part of the county
Primary landscape: Uplands
Slope: 1 to 5 percent

Composition

Extent of the unit in the survey area: Less than 1 percent of the area
Extent of the components in the unit:
Zaneis soils—48 percent
Renthin soils—17 percent
Minor components—35 percent (Ashport, Bethany, Darsil, Grainola, Harrah, Kirkland, Renfrow, Renthin, Stephenville, and Teller soils and Urban land)

Soil Characteristics

Zaneis

Surface layer: Dark brown loam
Subsoil: Reddish brown loam and clay loam, red and light red clay loam, and red sandy clay loam
Bedrock: Red sandstone
Depth class: Deep
Drainage class: Well drained
Seasonal high water table: None
Major landform: Upland hills
Slope: 1 to 3 percent
Parent material: Sandstone residuum

Renthin

Surface layer: Dark brown silty clay loam
Subsoil: Dark reddish gray silty clay loam and reddish brown silty clay
Bedrock: Red, soft, laminated shale
Depth class: Deep
Drainage class: Well drained
Seasonal high water table: None
Major landform: Upland hills
Slope: 3 to 5 percent
Parent material: Clayey and silty shale residuum

Use and Management

Uses: Cropland, hayland, pasture, rangeland, and urban development

Cropland
Suitability: Zaneis—well suited; Renthin—suited
Management concerns: Fertility, hazard of erosion, tilth, content of organic matter, and slope

Rangeland
Suitability: Zaneis—suited; Renthin—suited
Management concerns: Hazard of erosion, weed control, rotational grazing, proper stocking rates, and fertility

Pasture and hayland
Suitability: Zaneis—well suited; Renthin—suited
Management concerns: Hazard of erosion, fertility, tilth, and low content of organic matter

Urban development
Suitability: Zaneis—suited; Renthin—poorly suited
Management concerns: Shrink-swell potential, hazard of erosion, depth to bedrock, permeability, and slope

10. OK229—Littleaxe-Stephenville (Littleaxe-Stephenville)

Deep and moderately deep, well drained, loamy soils on forested uplands (fig. 6)

Setting

Location in the survey area: The eastern half of the county
Primary landscape: Uplands
Slope: 1 to 5 percent

Composition

Extent of the unit in the survey area: 6 percent of the area
Extent of the components in the unit:
Littleaxe soils—47 percent
Stephenville soils—23 percent
Minor components—30 percent (Darsil, Derby, Harrah, and Newalla soils and Urban land)

Soil Characteristics

Littleaxe

Surface layer: Grayish brown fine sandy loam
Subsurface layer: Light brown fine sandy loam
Subsoil: Reddish yellow sandy clay loam and reddish yellow and light red fine sandy loam
Bedrock: Reddish yellow, light red, and very pale brown sandstone
Depth class: Deep
Drainage class: Well drained
Seasonal high water table: None
Major landform: Upland hills
Slope: 1 to 3 percent
Parent material: Sandstone residuum

Stephenville

Surface layer: Brown fine sandy loam
Subsurface layer: Light reddish brown fine sandy loam
Subsoil: Red and light red sandy clay loam
Bedrock: Red and reddish yellow sandstone
Depth class: Moderately deep
Drainage class: Well drained
Seasonal high water table: None
Major landform: Upland hills
Slope: 1 to 5 percent
Parent material: Sandstone residuum

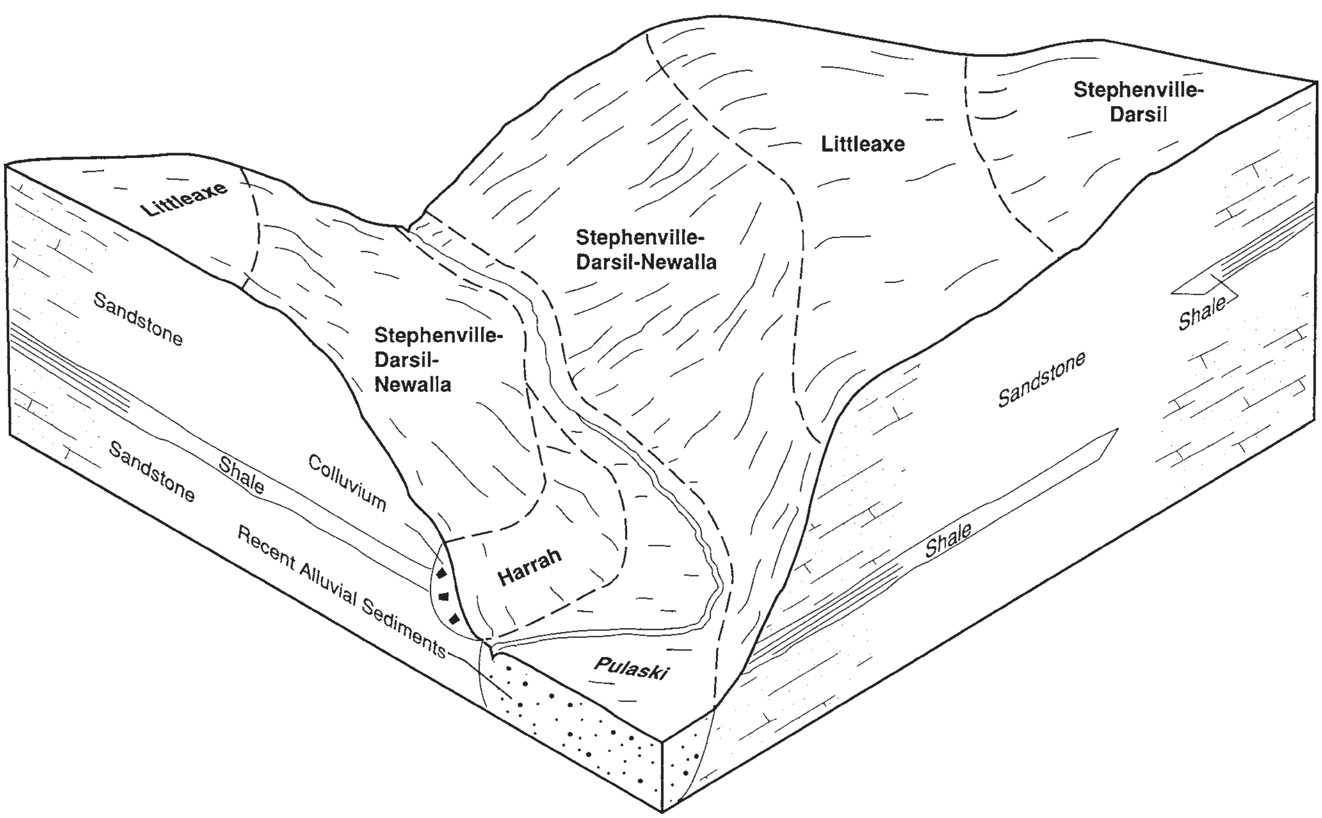

Figure 6.—Typical pattern of soils and underlying material in the Littleaxe-Stephenville general soil map unit.

Use and Management

Uses: Cropland, hayland, pasture, rangeland, and urban development

Cropland
Suitability: Littleaxe—suited; Stephenville—suited
Management concerns: Low content of organic matter, fertility, hazard of erosion, and slope

Rangeland
Suitability: Littleaxe—suited; Stephenville—suited
Management concerns: Proper stocking rates, rotational grazing, weed control, and low content of organic matter

Pasture and hayland
Suitability: Littleaxe—well suited; Stephenville—suited
Management concerns: Weed control, fertility, and low content of organic matter

Urban development
Suitability: Littleaxe—well suited; Stephenville—suited
Management concerns: Depth to bedrock, seepage, and slope

Formation and Classification of the Soils

This section relates the soils in Oklahoma County to the major factors of soil formation and describes the system of soil classification. The classification and extent of the soils in the county are shown in the tables “Classification of the Soils” and “Acreage and Proportionate Extent of the Soils,” which are at the end of this section.

Formation of the Soils

The major factors of soil formation are climate, living organisms, topography, parent material, and time.

Climate

Oklahoma County has a temperate, subhumid, continental climate. The climate is fairly uniform throughout the county, and differences between soils cannot be attributed to differences in the present climate. Sufficient moisture and warm temperatures have promoted the formation of distinct layers in many of the soils. Soil leaching is slow or moderate. Heavy rains have caused rapid runoff that has eroded many of the soils. This erosion is an indirect effect of climate.

Living Organisms

Plants, burrowing animals, insects, and soil micro-organisms have a direct influence on the formation of soils. The native grasses and trees in the county have had different effects on the losses and gains of organic matter and plant nutrients in the soils and on soil structure and porosity. Soils that formed under prairie vegetation, such as those of the Bethany and Kirkland series, have a dark grayish brown surface layer with a moderately high content of organic matter. Soils that formed under forest vegetation, such as those of the Konawa and Stephenville series, have a brown surface layer with a low content of organic matter.

Topography

Relief influences the formation of soils mainly through its effect on water movement, erosion, soil temperature, and the kind of plant cover. In Oklahoma County, relief is determined largely by resistance of the underlying formations to weathering, the activity of the Deep Fork and North Canadian Rivers and their major tributaries, and geologic erosion. In the western part of the county, the landscape is nearly level to sloping and is fairly stable and the soil-forming processes are more active than in the eastern part. The soils in the western part generally are moderately deep to very deep and are more strongly developed than the soils in the eastern part. The eastern part of the county is more dissected and is characterized by more runoff and erosion. The soils in this part of the county generally are very gently sloping to steep, are shallow or moderately deep, and are less well developed than the soils in the western part.

Parent Material

Soils form in unconsolidated material that influences the rate of soil formation, the color of the soil, and the chemical, physical, and mineral composition of the soil.

The soils on the uplands in Oklahoma County formed in material weathered from sandstone, siltstone, or shale or in old alluvial sediments. Coyle and Stephenville soils formed in material weathered from sandstone. Grainola, Kingfisher, and Renfrow soils formed in material weathered from shale. Norge, Teller, and Vanoss soils formed in loamy alluvial sediments, Bethany soils formed in clayey alluvial sediments over shale, and Kirkland soils formed in clayey alluvial sediments over sandstone. Harrah soils formed in loamy colluvial sediments weathered predominantly from sandstone.

Alluvial sediments are extensive along the Deep Fork River, the North Canadian River, and the many tributaries and other streams throughout the county. The kind of sediment deposited and the kinds of soil that form in it depend largely on the source of the sediment and the velocity of the floodwater. Ashport, Canadian, Easpur, and Keokuk soils formed in loamy sediments deposited by overflowing streams. Gaddy, Gracemore, and Yahola soils formed in sandy and loamy sediments deposited by fast-moving water near the North Canadian River. Pulaski and Tribbey soils formed in loamy and sandy sediments on low flood plains along the Deep Fork River and on along small streams. Watonga soils formed in clayey sediments

deposited by slow-moving water on high flood plains along the North Canadian River.

Eolian sediments and wind-reworked alluvial sediments are common on the north side of the North Canadian River. Derby soils formed in sandy eolian sediments deposited mostly as large dunes. Dougherty and Konawa soils formed in wind-reworked alluvial sediments.

Time

As a factor in soil formation, time is difficult to measure strictly in years. The length of time needed for the development of genetic horizons depends on the intensity and the interactions of the soil-forming factors in promoting the losses, gains, transfers, or transformations of the constituents necessary in forming soil horizons. Soils that have no definite genetic horizons are young or immature. Mature or older soils have approached equilibrium with their environment and tend to have well defined horizons.

The soils in Oklahoma County range from young to old. Bethany and Kirkland soils are examples of old soils on uplands. Teller and Zaneis soils are younger, but they have well expressed horizons. Darsil and Ironmound soils are considered young. They have had sufficient time to develop well expressed horizons. Because they are sloping, however, geologic erosion removes the soil material almost as fast as a soil forms. Gaddy and Yahola soils are young. Having formed in recently deposited sediments on flood plains, they show little evidence of horizon development.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ustoll (*Ust*, meaning dry, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Argiustolls (*Argi*, meaning argillic horizon, plus *ustoll*, the suborder of the Mollisols that has an ustic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Udic Argiustolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, thermic Udic Argiustolls.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral, and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Classification of the Soils

Soil name	Family or higher taxonomic class
Amber	Coarse-silty, mixed, superactive, thermic Udic Haplustepts
Asher	Fine-silty, mixed, superactive, thermic Fluventic Haplustolls
Ashport	Fine-silty, mixed, superactive, thermic Fluventic Haplustolls
Bethany	Fine, mixed, superactive, thermic Pachic Paleustolls
Canadian	Coarse-loamy, mixed, superactive, thermic Udic Haplustolls
Coyle	Fine-loamy, siliceous, active, thermic Udic Argiustolls
Dale	Fine-silty, mixed, superactive, thermic Pachic Haplustolls
Darsil	Thermic, shallow and coated Ustic Quartzipsamments
Derby	Mixed, thermic Lamellic Ustipsamments
Dougherty	Loamy, mixed, active, thermic Arenic Haplustalfs
Easpur	Fine-loamy, mixed, superactive, thermic Fluventic Haplustolls
Gaddy	Sandy, mixed, thermic Udic Ustifluvents
Gracemont	Coarse-loamy, mixed, superactive, calcareous, thermic Oxyaquic Udifluvents
Gracemore	Sandy, mixed, thermic Oxyaquic Udifluvents
Grainola	Fine, mixed, active, thermic Udertic Haplustalfs
Grant	Fine-silty, mixed, superactive, thermic Udic Argiustolls
Harrah	Fine-loamy, siliceous, active, thermic Ultic Paleustalfs
Hibsaw	Fine-silty, mixed, superactive, nonacid, thermic Aeric Halaquepts
Huska	Fine, mixed, superactive, thermic Mollic Natrustalfs
Ironmound	Loamy, mixed, active, thermic, shallow Udic Haplustepts
Keokuk	Coarse-silty, mixed, superactive, thermic Fluventic Haplustolls
Kingfisher	Fine-silty, mixed, active, thermic Udic Argiustolls
Kirkland	Fine, mixed, superactive, thermic Udertic Paleustolls
Konawa	Fine-loamy, mixed, active, thermic Ultic Haplustalfs
Latrass	Fine, mixed, active, nonacid, thermic Haplic Ustarents
Lawrie	Fine-silty, mixed, superactive, thermic Pachic Argiustolls
Littleaxe	Fine-loamy, siliceous, active, thermic Ultic Haplustalfs
Lomill	Clayey over loamy, mixed, superactive, thermic Udertic Haplustolls
Miller	Fine, mixed, superactive, thermic Udertic Haplustolls
Newalla	Fine-loamy over clayey, siliceous, superactive, thermic Udic Haplustalfs
Norge	Fine-silty, mixed, active, thermic Udic Paleustolls
Piedmont	Fine, mixed, superactive, thermic Udertic Argiustolls
Pulaski	Coarse-loamy, mixed, superactive, nonacid, thermic Udic Ustifluvents
Renfrow	Fine, mixed, superactive, thermic Udertic Paleustolls
Renthin	Fine, mixed, superactive, thermic Udertic Argiustolls
Stephenville	Fine-loamy, siliceous, active, thermic Ultic Haplustalfs
Teller	Fine-loamy, mixed, active, thermic Udic Argiustolls
Teval	Fine-loamy, mixed, active, thermic Udic Argiustolls
Tribbey	Coarse-loamy, mixed, superactive, nonacid, thermic Oxyaquic Udifluvents
Vanoss	Fine-silty, mixed, superactive, thermic Udic Argiustolls
Watonga	Fine, smectitic, thermic Udic Haplusterts
Waurika	Fine, smectitic, thermic Vertic Argialbolls
Yahola	Coarse-loamy, mixed, superactive, calcareous, thermic Udic Ustifluvents
Zaneis	Fine-loamy, siliceous, active, thermic Udic Argiustolls

Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
AhpA	Ashport silty clay loam, 0 to 1 percent slopes, occasionally flooded-----	1,734	0.4
AmbE	Amber very fine sandy loam, 5 to 15 percent slopes, rarely flooded-------	953	0.2
AshA	Asher silty clay loam, 0 to 1 percent slopes, rarely flooded------------	2,118	0.5
AspA	Ashport silt loam, 0 to 1 percent slopes, occasionally flooded----------	3,473	0.8
AstA	Ashport silt loam, 0 to 1 percent slopes, frequently flooded------------	8,488	1.8
BetA	Bethany silt loam, 0 to 1 percent slopes--------------------------------	1,572	0.3
BetB	Bethany silt loam, 1 to 3 percent slopes--------------------------------	1,263	0.3
BeUB	Bethany-Urban land complex, 0 to 3 percent slopes-----------------------	4,851	1.1
CaaA	Canadian fine sandy loam, 0 to 1 percent slopes, rarely flooded----------	158	*
CaUB	Canadian-Urban land complex, 0 to 1 percent slopes, rarely flooded-------	304	*
CoIC2	Coyle-Ironmound complex, 3 to 5 percent slopes, eroded------------------	598	0.1
CoUB	Coyle-Urban land complex, 1 to 3 percent slopes-------------------------	619	0.1
CoyB	Coyle loam, 1 to 3 percent slopes---------------------------------------	499	0.1
DalA	Dale silt loam, 0 to 1 percent slopes, rarely flooded-------------------	2,860	0.6
DAM	Dams--	147	*
DaUA	Dale-Urban land complex, 0 to 1 percent slopes, rarely flooded----------	1,579	0.3
DeDE	Derby-Dougherty complex, 0 to 15 percent slopes-------------------------	1,703	0.4
DerB	Derby loamy fine sand, 0 to 3 percent slopes----------------------------	658	0.1
DerE	Derby loamy fine sand, 8 to 15 percent slopes---------------------------	1,298	0.3
DleA	Dale silty clay loam, 0 to 1 percent slopes, rarely flooded-------------	374	*
DSRG	Darsil-Stephenville-Rock outcrop complex, 3 to 45 percent slopes---------	934	0.2
DUDE	Derby-Urban land-Dougherty complex, 0 to 15 percent slopes--------------	2,221	0.5
EasA	Easpur loam, 0 to 1 percent slopes, occasionally flooded----------------	1,516	0.3
GaGA	Gaddy-Gracemore complex, 0 to 1 percent slopes, frequently flooded-------	3,016	0.7
GcmA	Gracemont silty clay, 0 to 1 percent slopes, frequently flooded, overwash	2,102	0.5
GmtA	Gracemont fine sandy loam, 0 to 1 percent slopes, occasionally flooded---	1,258	0.3
GraC	Grainola silty clay loam, 3 to 5 percent slopes-------------------------	750	0.2
GrAD	Grainola-Ashport complex, 0 to 8 percent slopes-------------------------	6,857	1.5
GrHC	Grant-Huska complex, 1 to 5 percent slopes------------------------------	214	*
GrIE	Grainola-Ironmound complex, 3 to 12 percent slopes----------------------	6,488	1.4
GrPB2	Grainola-Piedmont complex, 1 to 3 percent slopes, eroded----------------	1,241	0.3
GrPC2	Grainola-Piedmont complex, 3 to 5 percent slopes, eroded----------------	3,784	0.8
GUIE	Grainola-Urban land-Ironmound complex, 3 to 12 percent slopes-----------	4,047	0.9
HarC	Harrah fine sandy loam, 3 to 5 percent slopes---------------------------	36,365	7.9
HarC2	Harrah fine sandy loam, 3 to 5 percent slopes, eroded-------------------	4,717	1.0
HarC4	Harrah fine sandy loam, 3 to 5 percent slopes, gullied------------------	702	0.2
HarG	Harrah fine sandy loam, 3 to 45 percent slopes--------------------------	6,713	1.5
HaUC	Harrah-Urban land complex, 3 to 5 percent slopes------------------------	3,737	0.8
HiLA	Hibsaw-Lomill complex, 0 to 1 percent slopes, occasionally flooded-------	489	0.1
IrCE	Ironmound-Coyle complex, 5 to 15 percent slopes-------------------------	1,194	0.3
IrKD	Ironmound-Kingfisher complex, 1 to 8 percent slopes---------------------	540	0.1
KekA	Keokuk very fine sandy loam, 0 to 1 percent slopes, rarely flooded-------	2,299	0.5
KeoA	Keokuk very fine sandy loam, 0 to 1 percent slopes, occasionally flooded	1,119	0.2
KeUA	Keokuk-Urban land complex, 0 to 1 percent slopes, rarely flooded---------	493	0.1
KgIC	Kingfisher-Ironmound complex, 1 to 5 percent slopes---------------------	1,080	0.2
KowB	Konawa fine sandy loam, 1 to 3 percent slopes---------------------------	2,729	0.6
KowD	Konawa fine sandy loam, 3 to 8 percent slopes---------------------------	3,635	0.8
KowD2	Konawa fine sandy loam, 3 to 8 percent slopes, eroded-------------------	2,697	0.6
KowD4	Konawa fine sandy loam, 3 to 8 percent slopes, gullied------------------	503	0.1
KrdA	Kirkland silt loam, 0 to 1 percent slopes-------------------------------	8,917	1.9
KrUA	Kirkland-Urban land complex, 0 to 1 percent slopes----------------------	9,659	2.1
KUIC	Kingfisher-Urban land-Ironmound complex, 1 to 5 percent slopes-----------	412	*
KwUD	Konawa-Urban land complex, 1 to 8 percent slopes------------------------	2,833	0.6
LarA	Lawrie silt loam, 0 to 1 percent slopes, occasionally flooded-----------	1,672	0.4
LatG	Latrass loam, 1 to 45 percent slopes------------------------------------	1,407	0.3
LawA	Lawrie loam, 0 to 1 percent slopes, rarely flooded----------------------	754	0.2
LitB	Littleaxe fine sandy loam, 1 to 3 percent slopes------------------------	7,248	1.6
LitC	Littleaxe fine sandy loam, 3 to 5 percent slopes------------------------	1,911	0.4
LitC2	Littleaxe fine sandy loam, 3 to 5 percent slopes, eroded----------------	1,541	0.3
LomA	Lomill silty clay loam, 0 to 1 percent slopes, occasionally flooded------	1,084	0.2
LtUC	Littleaxe-Urban land complex, 1 to 5 percent slopes---------------------	2,607	0.6
LweA	Lawrie silty clay loam, 0 to 1 percent slopes, occasionally flooded------	912	0.2

See footnote at end of table.

Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
LwfA	Lawrie fine sandy loam, 0 to 1 percent slopes, occasionally flooded	1,209	0.3
LwUA	Lawrie-Urban land complex, 0 to 1 percent slopes, rarely flooded	1,970	0.4
MlfA	Miller fine sandy loam, 0 to 1 percent slopes, occasionally flooded, overwash	257	*
MllA	Miller silty clay, 0 to 1 percent slopes, occasionally flooded	2,188	0.5
M-W	Miscellaneous water	261	*
NewB	Newalla fine sandy loam, 1 to 3 percent slopes	761	0.2
NewC2	Newalla fine sandy loam, 3 to 5 percent slopes, eroded	575	0.1
NorB	Norge silt loam, 1 to 3 percent slopes	2,003	0.4
NorC	Norge silt loam, 3 to 5 percent slopes	1,141	0.2
NorC2	Norge silt loam, 3 to 5 percent slopes, eroded	1,235	0.3
NoUC	Norge-Urban land complex, 1 to 5 percent slopes	6,689	1.5
PdHC	Piedmont-Huska complex, 1 to 5 percent slopes	1,214	0.3
PieC2	Piedmont silty clay loam, 3 to 5 percent slopes, eroded	110	*
PimB	Piedmont silt loam, 1 to 3 percent slopes	1,709	0.4
PimC	Piedmont silt loam, 3 to 5 percent slopes	1,874	0.4
PIT	Pits	1,881	0.4
PukA	Pulaski fine sandy loam, 0 to 1 percent slopes, frequently flooded	1,884	0.4
PulA	Pulaski fine sandy loam, 0 to 1 percent slopes, occasionally flooded	7,113	1.5
RenB	Renfrow silt loam, 1 to 3 percent slopes	5,851	1.3
RinB	Renthin silt loam, 1 to 3 percent slopes	5,641	1.2
RnnB	Renthin silty clay loam, 1 to 3 percent slopes	2,523	0.5
RnnC2	Renthin silty clay loam, 3 to 5 percent slopes, eroded	12,428	2.7
RnUC	Renthin-Urban land complex, 1 to 5 percent slopes	23,843	5.2
SDGD4	Stephenville-Darsil-Gullied land complex, 3 to 8 percent slopes	8,122	1.8
SDND	Stephenville-Darsil-Newalla complex, 3 to 8 percent slopes	59,949	13.0
SDND2	Stephenville-Darsil-Newalla complex, 3 to 8 percent slopes, eroded	10,142	2.2
StDC	Stephenville-Darsil complex, 1 to 5 percent slopes	24,797	5.4
StDC2	Stephenville-Darsil complex, 1 to 5 percent slopes, eroded	4,250	0.9
StLC4	Stephenville-Littleaxe complex, 1 to 5 percent slopes, gullied	409	*
SUND	Stephenville-Urban land-Newalla complex, 1 to 8 percent slopes	12,345	2.7
TevD	Teval loam, 3 to 8 percent slopes	506	0.1
TevD2	Teval loam, 3 to 8 percent slopes, eroded	266	*
TlrB	Teller fine sandy loam, 1 to 3 percent slopes	1,356	0.3
TlrC	Teller fine sandy loam, 3 to 5 percent slopes	1,403	0.3
TlrC2	Teller fine sandy loam, 3 to 5 percent slopes, eroded	819	0.2
TlrD	Teller fine sandy loam, 5 to 8 percent slopes	305	*
TlUD	Teller-Urban land complex, 1 to 8 percent slopes	8,305	1.8
TriA	Tribbey fine sandy loam, 0 to 1 percent slopes, frequently flooded	8,524	1.9
URB	Urban land	31,475	6.8
VanA	Vanoss silt loam, 0 to 1 percent slopes	170	*
VanB	Vanoss silt loam, 1 to 3 percent slopes	404	*
W	Water	9,003	2.0
WauA	Waurika silt loam, 0 to 1 percent slopes	120	*
WtgA	Watonga silty clay, 0 to 1 percent slopes, rarely flooded	2,157	0.5
WuUA	Watonga-Urban land complex, 0 to 1 percent slopes, rarely flooded	674	0.1
YaGA	Yahola-Gaddy complex, 0 to 1 percent slopes, occasionally flooded	677	0.1
YahA	Yahola fine sandy loam, 0 to 1 percent slopes, occasionally flooded	4,106	0.9
YaUA	Yahola-Urban land complex, 0 to 1 percent slopes, protected	2,543	0.6
ZanB	Zaneis loam, 1 to 3 percent slopes	1,126	0.2
ZanC	Zaneis loam, 3 to 5 percent slopes	653	0.1
ZanC2	Zaneis loam, 3 to 5 percent slopes, eroded	531	0.1
ZaUC	Zaneis-Urban land complex, 1 to 5 percent slopes	659	0.1
	Total	459,802	100.0

* Less than 0.1 percent. The combined extent of the soils assigned an asterisk in the "Percent" column is about 0.9 percent of the survey area.

Soil Series

In this section each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each soil series. Also, the physiographic region, province, and subprovince of most of the series are specified (Fenneman, 1930). A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (USDA, 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (USDA, 1999) and in “Keys to Soil Taxonomy” (USDA, 1994). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

Amber Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Loamy, calcareous alluvium of Pleistocene age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Low flood plains, high flood plains, or terraces
Position: Risers
Slope: 1 to 15 percent
Slope shape: Convex-linear
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 38 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Coarse-silty, mixed, superactive, thermic Udic Haplustepts

Associated Soils

These are the Dale, McLain, and Reinach soils. All of these associated soils have a mollic epipedon that is more than 20 inches thick. In addition, Dale soils have a fine-silty control section and McLain soils have a Bt horizon and a fine textured control section.

Typical Pedon

Amber very fine sandy loam, in a cultivated area; Grady County, Oklahoma; about 1 mile east of Bradley; 3,000 feet north and 100 feet east of the southwest corner of sec. 25, T. 5 N., R. 5 W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 12 inches; reddish brown (5YR 5/4) very fine sandy loam, reddish brown (5YR 4/4) moist; weak fine granular structure; slightly hard, friable; many fine roots; neutral; clear smooth boundary. (4 to 14 inches thick)

Bw—12 to 36 inches; yellowish red (5YR 5/6) very fine sandy loam, yellowish red (5YR 4/6) moist; weak fine granular structure; slightly hard, friable; many fine roots; moderately alkaline; gradual smooth boundary. (17 to 34 inches thick)

C—36 to 72 inches; reddish yellow (5YR 7/8) fine sandy loam, reddish yellow (5YR 6/8) moist; massive; slightly hard, very friable; common fine roots; stratified with thin layers of reddish yellow (5YR 6/6) very fine sandy loam; few films and soft spots of secondary lime below a depth of 40 inches; calcareous; moderately alkaline.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to bedrock: More than 80 inches
Depth to carbonates: More than 20 inches

A horizon:
Color—hue of 5YR or 7.5YR, value of 4 or 5 (3 or 4 moist), and chroma of 2 to 6
Texture—silt loam, loam, or very fine sandy loam
Reaction—slightly acid to moderately alkaline
Roots—many fine
Clay content—10 to 18 percent
Thickness—4 to 14 inches

Bw horizon:

Color—hue of 2.5YR to 7.5YR, value of 4 to 6 (3 or 4 moist), and chroma of 3 to 8
Texture—silt loam, loam, or very fine sandy loam
Reaction—neutral to moderately alkaline; calcareous in the lower part
Roots—many fine
Clay content—10 to 18 percent
Thickness—11 to 34 inches

C horizon:

Color—hue of 2.5YR to 7.5YR, value of 5 to 7 (4 to 6 moist), and chroma of 4 to 8
Texture—stratified silty clay loam, silt loam, loam, very fine sandy loam, or loamy fine sand
Reaction—moderately alkaline and calcareous
Roots—common fine
Clay content—5 to 18 percent

Asher Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Moderately well drained
Parent material and geologic age: Loamy alluvium of Recent age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: High flood plains
Slope: 0 to 1 percent
Slope shape: Linear-linear
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 38 inches
Mean annual air temperature: 58 to 63 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine-silty, mixed, superactive, thermic Fluventic Haplustolls

Associated Soils

These are the Keokuk, Lela, and Miller soils. Keokuk soils are on the same flood plains as the Asher soils but are nearer the stream channels. Lela and Miller soils have more than 35 percent clay in the control section. They are on the same flood plains as the Asher soils but are farther from the stream channels, in slightly concave areas.

Typical Pedon

Asher silty clay loam, in a cultivated area; Pottawatomie County, Oklahoma; about 1 mile north of McLoud, Oklahoma; about 1,200 feet north and 50 feet east of the southwest corner of sec. 3, T. 11 N., R. 2 E. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 10 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; weak fine granular structure; hard, firm; many roots; many pores; slightly alkaline; abrupt smooth boundary. (7 to 20 inches thick)

Bw—10 to 21 inches; reddish brown (5YR 5/3) silty clay loam, reddish brown (5YR 4/3) moist; weak fine blocky structure; very hard, firm; secondary carbonates below a depth of 14 inches; dark gray (10YR 4/1) coatings on faces of some peds; calcareous; moderately alkaline; clear smooth boundary. (10 to 24 inches thick)

2C—21 to 65 inches; brown (10YR 5/3) silt loam, brown (10YR 4/3) moist; massive; slightly hard, very friable; common thin strata of brown very fine sandy loam, fine sandy loam, and silty clay loam; calcareous; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 20 inches
Thickness of the solum: 20 to 38 inches
Depth to bedrock: More than 80 inches
Depth to carbonates: 11 to 45 inches
Depth to a coarse-silty texture: 20 to 38 inches
Depth to a buried horizon: More than 50 inches

A horizon:

Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 1 to 3
Texture—silt loam or silty clay loam
Reaction—slightly acid to moderately alkaline
Roots—many
Pores—many
Clay content—18 to 40 percent
Thickness—7 to 20 inches

Bw horizon:

Color—hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 2 to 6
Texture—silty clay loam
Reaction—neutral to moderately alkaline
Clay content—27 to 40 percent
Thickness—10 to 24 inches

2C horizon:

Color—hue of 2.5YR to 10YR, value of 4 to 7, and chroma of 2 to 8
Texture—stratified silt loam, silty clay loam, loam, very fine sandy loam, fine sandy loam, or loamy very fine sand

Thickness of the strata—1/8 inch to 6 inches, mostly less than 3 inches
Reaction—neutral to moderately alkaline in the upper part and moderately alkaline and calcareous in the lower part
Clay content—5 to 18 percent

Ashport Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Loamy alluvium of Recent age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Low flood plains
Slope: 0 to 3 percent
Slope shape: Linear-linear
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 65 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine-silty, mixed, superactive, thermic Fluventic Haplustolls

Associated Soils

These are the Dale, Port, and Pulaski soils. Dale soils are in the slightly higher areas or on the higher flood plains that are rarely flooded. Port soils are on landscapes similar to those of the Ashport soils but generally are farther from the stream channels. Dale and Port soils have a mollic epipedon that is more than 20 inches thick. Pulaski soils are on landscapes similar to those of the Ashport soils but are generally nearer to the stream channels. The have a coarse-loamy control section and do not have a mollic epipedon.

Typical Pedon

Ashport silty clay loam, in a cultivated area; Payne County, Oklahoma; about one-half mile west of Stillwater, Oklahoma; 2,440 feet east and 920 feet north of the southwest corner of sec. 16, T. 19 N., R. 2 E. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 5 inches; dark reddish gray (5YR 4/2) silty clay loam, dark reddish brown (5YR 3/2) moist; weak medium platy structure; hard; firm; many fine roots; slightly acid; abrupt smooth boundary. (0 to 8 inches thick)
A—5 to 16 inches; dark reddish gray (5YR 4/2) silty clay loam, dark reddish brown (5YR 3/2) moist; moderate medium subangular blocky structure; hard, firm; many fine roots; neutral; clear smooth boundary. (0 to 16 inches thick)
Bw—16 to 36 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 5/4) moist; weak coarse prismatic structure parting to moderate coarse subangular blocky; hard, firm; few fine roots; slightly acid; clear smooth boundary. (14 to 54 inches thick)
Ab—36 to 52 inches; dark reddish gray (5YR 4/2) loam, dark reddish brown (5YR 3/2) moist; weak coarse prismatic structure parting to weak medium granular; slightly hard, friable; slightly acid; gradual smooth boundary. (0 to 20 inches thick)
Bwb—52 to 66 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; slightly acid; gradual smooth boundary. (0 to 27 inches thick)
BCb—66 to 80 inches; yellowish red (5YR 5/6) loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; slightly hard, friable; neutral.

Range in Characteristics

Thickness of the mollic epipedon: Less than 20 inches
Thickness of the solum: 26 to more than 60 inches
Depth to carbonates: 20 to 60 inches
Depth to bedrock: More than 80 inches
Depth to a buried horizon: 24 to more than 60 inches

A horizon:
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3
Texture—silt loam, loam, clay loam, or silty clay loam
Reaction—moderately acid to moderately alkaline
Roots—many fine
Clay content—15 to 35 percent
Thickness—10 to 16 inches

Bw horizon:
Color—hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 3 to 6
Texture—silty clay loam, clay loam, loam, or silt loam
Reaction—slightly acid to moderately alkaline
Roots—few fine
Clay content—18 to 35 percent

Thickness—14 to 54 inches

C horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6
Texture—loam, silt loam, silty clay loam, or clay loam stratified with coarser or finer textured material
Reaction—slightly alkaline or moderately alkaline
Clay content—18 to 35 percent
Thickness—0 to 24 inches

Ab horizon:
Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4
Texture—loam, silt loam, clay loam, or silty clay loam
Reaction—slightly acid to moderately alkaline
Clay content—18 to 35 percent
Thickness—0 to 20 inches

Bwb horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 3 to 6
Texture—loam, silt loam, or silty clay loam
Reaction—slightly acid to moderately alkaline
Clay content—18 to 35 percent
Thickness—0 to 27 inches

BCb horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 6
Texture—loam, silt loam, or silty clay loam
Reaction—slightly acid to moderately alkaline
Clay content—18 to 35 percent

Bethany Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Alluvium or loess of Pleistocene age over shale of Permian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Terraces
Position: Treads
Slope: 0 to 5 percent
Slope shape: Linear-linear
Elevation: 950 to 1,250 feet
Mean annual precipitation: 26 to 38 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free days: 190 to 220
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine, mixed, superactive, thermic Pachic Paleustolls

Associated Soils

These are the Kirkland, Norge, Pond Creek, Renfrow, Tabler, and Vanoss soils. Kirkland, Norge, Pond Creek, Renfrow, and Vanoss soils are on landscapes similar to those of the Bethany soils. Kirkland and Renfrow soils have a COLE value of 0.07 or more. In addition, Kirkland soils have an abrupt textural change from the A horizon to the Bt horizon. Norge, Pond Creek, and Vanoss soils have less than 35 percent clay in the control section. Norge, Renfrow, and Vanoss soils have a mollic epipedon that is less than 20 inches thick. Tabler soils are on the same landscape an the Bethany soils but are in slightly lower positions. They have a COLE value of 0.07 or more, redoximorphic accumulations and depletions in the Bt horizon, and smectitic mineralogy.

Typical Pedon

Bethany silt loam, in a cultivated area; Oklahoma County, Oklahoma; about 1 mile east of Wheatland; 1,000 feet north and 200 feet east of the southwest corner of sec. 28, T. 11 N., R. 4 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; many fine roots; slightly acid; clear smooth boundary. (0 to 10 inches thick)
A—6 to 14 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, friable; many fine roots; slightly acid; gradual smooth boundary. (6 to 20 inches thick)
BA—14 to 18 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; hard, firm; many fine roots; neutral; clear smooth boundary. (3 to 10 inches thick)
Bt1—18 to 36 inches; dark brown (10YR 4/3) silty clay, dark brown (10YR 3/3) moist; strong fine and medium blocky structure; very hard, very firm; clay films on faces of peds; common fine roots; slightly alkaline; gradual smooth boundary. (10 to 25 inches thick)
Bt2—36 to 56 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; moderate medium and coarse blocky structure; very hard, very firm; clay films on faces of peds; few fine roots; common fine

concretions of iron and manganese; few fine concretions of calcium carbonate; moderately alkaline; gradual smooth boundary. (10 to 30 inches thick)

Bt3—56 to 72 inches; brown (7.5YR 5/4) silty clay, dark brown (7.5YR 4/4) moist; common fine and coarse distinct yellowish red (5YR 5/6) and reddish brown (5YR 5/4) redoximorphic features; moderate medium and coarse blocky structure; very hard, very firm; patchy clay films on faces of peds; few fine roots; common fine concretions of iron and manganese; few soft accumulations of secondary lime; few fine concretions of calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary. (10 to 20 inches thick)

Bt4—72 to 80 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; common coarse distinct brown (7.5YR 5/4) and red (2.5YR 5/6) redoximorphic features; weak medium blocky structure; very hard, very firm; patchy clay films on faces of peds; few fine concretions of calcium carbonate; calcareous; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: More than 20 inches
Thickness of the solum: More than 60 inches
Depth to bedrock: More than 80 inches
Depth to carbonates: 28 to 40 inches

A horizon:
Color—hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 or 3
Texture—silt loam or silty clay loam
Reaction—strongly acid to neutral
Salinity—electrical conductivity of 0 to 1 mmhos/cm in the saturation extract
Roots—many fine
Clay content—15 to 35 percent
Thickness—8 to 20 inches

BA horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 or 3
Texture—silty clay loam or clay loam
Reaction—slightly acid to slightly alkaline
Salinity—electrical conductivity of 0 to 1 mmhos/cm in the saturation extract
Roots—many fine
Clay content—27 to 35 percent
Thickness—3 to 10 inches

Bt1 horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 or 3
Texture—clay, silty clay, clay loam, or silty clay loam
Reaction—neutral to moderately alkaline
Salinity—electrical conductivity of 0 to 1 mmhos/cm in the saturation extract
Roots—common fine
Clay content—35 to 50 percent
Thickness—10 to 25 inches

Bt2 horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 6
Texture—clay, silty clay, clay loam, or silty clay loam
Reaction—neutral to moderately alkaline
Salinity—electrical conductivity of 0 to 4 mmhos/cm in the saturation extract
Sodium adsorption ratio—0 to 8 percent
Roots—few fine
Redoximorphic features—few or common accumulations in shades of brown
Clay content—35 to 50 percent
Thickness—10 to 30 inches

Bt3 horizon:
Color—hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 6
Texture—clay, silty clay, clay loam, or silty clay loam
Reaction—slightly alkaline or moderately alkaline
Salinity—electrical conductivity of 0 to 4 mmhos/cm in the saturation extract
Clay content—35 to 50 percent
Redoximorphic features—accumulations and depletions in shades of yellow, red, gray, and brown
Sodium adsorption ratio—0 to 8 percent
Roots—many fine
Thickness—8 to 20 inches

Bt4 horizon:
Color—hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 6
Texture—clay, silty clay, clay loam, or silty clay loam
Reaction—neutral to moderately alkaline
Clay content—35 to 50 percent
Redoximorphic features—accumulations and depletions in shades of yellow, red, gray, and brown

Canadian Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Well drained

Parent material and geologic age: Loamy alluvium of Pleistocene age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: High flood plains
Slope: 0 to 3 percent
Slope shape: Linear-linear
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Coarse-loamy, mixed, superactive, thermic Udic Haplustolls

Associated Soils

These are the Crisfield, Dale, Lela, Lincoln, McLain, Miller, Port, Pulaski, Reinach, and Yahola soils. Crisfield, Dale, Lela, McLain, and Reinach soils are adjacent soils of the same terraces. Crisfield soils have hue of 5YR or redder in the control section. Dale and Port soils have a mollic epipedon that is more than 20 inches thick and have more than 18 percent clay in the control section. Lela, McLain, and Miller soils have more than 35 percent clay in the control section. Lincoln, Miller, Port, Pulaski, and Yahola soils are in the lower positions on flood plains. Lincoln, Pulaski, and Yahola soils do not have a mollic epipedon. In addition, Lincoln soils have a sandy control section. Reinach soils have a mollic epipedon that is more than 20 inches thick and have less than 18 percent clay and less than 15 percent material coarser than very fine sand in the control section.

Typical Pedon

Canadian fine sandy loam, in a cultivated area; Oklahoma County, Oklahoma; about one-half mile north of the intersection of Reno Avenue and Council Road in Oklahoma City; 2,600 feet north and 830 feet east of the southwest corner of sec. 32, T. 12 N., R. 4 W. (Colors are for dry soil unless otherwise indicated.)

A1—0 to 8 inches; dark grayish brown (10YR 4/2) (crushed, dry) fine sandy loam, very dark grayish brown (10YR 3/2) crushed, moist; weak medium platy structure parting to weak fine granular; slightly hard, very friable; many very fine and fine roots; many very fine pores; noneffervescent; neutral; clear smooth boundary. (0 to 10 inches thick)

A2—8 to 18 inches; dark grayish brown (10YR 4/2) (crushed, dry) fine sandy loam, very dark grayish brown (10YR 3/2) crushed, moist; weak medium granular structure; slightly hard, very friable; many very fine and fine roots; many very fine pores; noneffervescent; slightly alkaline; clear smooth boundary. (8 to 20 inches thick)

Bw—18 to 28 inches; brown (7.5YR 5/2) (crushed, dry) fine sandy loam, brown (7.5YR 4/2) crushed, moist; weak medium subangular blocky structure parting to weak medium granular; slightly hard, very friable; common very fine and fine roots; many very fine pores; noneffervescent; slightly alkaline; gradual wavy boundary. (10 to 35 inches thick)

C1—28 to 43 inches; strong brown (7.5YR 5/6) (crushed, dry) fine sandy loam, strong brown (7.5YR 4/6) crushed, moist; massive; slightly hard, very friable; common very fine and few fine roots; noneffervescent; slightly alkaline; gradual wavy boundary. (12 to 20 inches thick)

C2—43 to 52 inches; yellowish red (5YR 5/6) (crushed, dry) fine sandy loam, yellowish red (5YR 4/6) crushed, moist; massive; slightly hard, very friable; common very fine and few fine roots; noneffervescent; slightly alkaline; gradual smooth boundary. (0 to 20 inches thick)

C3—52 to 84 inches; reddish yellow (5YR 6/6) (crushed, dry) loamy fine sand, yellowish red (5YR 5/6) crushed, moist; single grain; soft, very friable; few very fine and few fine roots; stratified with thin layers that are red (2.5YR 4/6) moist; noneffervescent; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 20 inches
Thickness of the solum: 20 to 50 inches
Depth to bedrock: More than 80 inches

A or Ap horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 or 3
Texture—fine sandy loam, sandy loam, very fine sandy loam, or loam
Reaction—very strongly acid to slightly alkaline
Clay content—5 to 18 percent
Combined thickness of the A1 and A2 horizons—7 to 20 inches

Bw horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 to 6
Texture—fine sandy loam, sandy loam, or loam
Reaction—slightly acid to moderately alkaline
Clay content—10 to 18 percent

Thickness—10 to 35 inches

C1 horizon:
Color—hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 6
Texture—mainly fine sandy loam, sandy loam, or loam; also includes loamy fine sand or fine sand below a depth of 40 inches in some pedons
Reaction—slightly acid to moderately alkaline
Clay content—5 to 18 percent
Thickness—12 to 20 inches

C2 and C3 horizons:
Color—hue of 5YR to 10YR, value of 5 to 7, and chroma of 3 to 6
Texture—mainly fine sandy loam, sandy loam, loam, or loamy fine sand; also includes fine sand below a depth of 40 inches in some pedons
Reaction—slightly acid to moderately alkaline
Clay content—5 to 18 percent

Coyle Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Moderately deep
Drainage class: Well drained
Parent material and geologic age: Material weathered from sandstone of Permian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Summits and backslopes
Slope: 1 to 12 percent
Slope shape: Convex-convex
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Frost-free days: 190 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine-loamy, siliceous, active, thermic Udic Argiustolls

Associated Soils

These are the Grainola, Lucien, Renfrow, and Zaneis soils. Grainola and Renfrow soils generally are on convex side slopes below the Coyle soils. They have a fine textured control section. Lucien soils are on landscapes similar to those of the Coyle soils. They have a solum that is less than 20 inches thick over sandstone and do not have a Bt horizon. Zaneis soils generally are on side slopes below the Coyle soils. They have a solum that is more than 40 inches thick.

Typical Pedon

Coyle loam, in an area of rangeland; Payne County, Oklahoma; about 6 miles south and 3 miles west of Stillwater; 70 feet north and 460 feet west of the southeast corner of sec. 17, T. 18 N., R. 2 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 11 inches; dark reddish gray (5YR 4/2) loam, dark reddish brown (5YR 3/2) moist; strong fine granular structure; slightly hard, friable; many fine roots; slightly alkaline; clear smooth boundary. (6 to 14 inches thick)

BA—11 to 14 inches; reddish brown (5YR 4/3) loam, dark reddish brown (5YR 3/3) moist; moderate medium granular structure; slightly hard, friable; many fine roots; many fine pores; many wormcasts; slightly alkaline; clear smooth boundary. (0 to 8 inches thick)

Bt1—14 to 31 inches; red (2.5YR 5/6) clay loam, red (2.5YR 4/6) moist; moderate medium subangular blocky structure; hard, firm; common fine roots; thin nearly continuous clay films on faces of peds; neutral; gradual smooth boundary. (7 to 19 inches thick)

Bt2—31 to 39 inches; light red (2.5YR 6/8) sandy clay loam, red (2.5YR 5/8) moist; weak coarse subangular blocky structure; hard, firm; common fine roots; few fragments of sandstone less than 76 millimeters in diameter; patchy clay films on faces of peds; neutral; abrupt smooth boundary. (0 to 16 inches thick)

Cr—39 to 42 inches; red (2.5YR 5/6) sandstone; can be augered when moist.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 20 inches
Thickness of the solum: 20 to 40 inches
Depth to bedrock: 20 to 40 inches

A or Ap horizon:
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3
Texture—fine sandy loam or loam
Reaction—moderately acid to slightly alkaline
Roots—many fine
Clay content—10 to 26 percent
Thickness—6 to 14 inches

BA horizon:
Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4
Texture—loam or fine sandy loam

Reaction—moderately acid to slightly alkaline
Roots—many fine
Pores—many fine
Clay content—18 to 26 percent
Thickness—0 to 8 inches

Bt1 horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 3 to 6
Texture—clay loam, loam, or sandy clay loam
Reaction—moderately acid to slightly alkaline
Roots—common fine
Clay content—20 to 35 percent
Redoximorphic features—red or brown concentrations
Content of rock fragments, by volume—0 to 10 percent fragments less than 76 millimeters in diameter
Thickness—7 to 19 inches

Bt2 horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8
Texture—clay loam, fine sandy loam, loam, sandy clay loam, or the channery, flaggy, or gravelly analogs of those textures
Reaction—moderately acid to slightly alkaline
Roots—common fine
Clay content—18 to 35 percent
Redoximorphic features—yellow, red, or brown concentrations
Content of rock fragments, by volume—0 to 35 percent sandstone fragments (about 0 to 30 percent less than 76 millimeters in diameter and 0 to 30 percent more than 76 millimeters in diameter)
Thickness—0 to 16 inches

Bt3 horizon (where present):
Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8
Texture—clay loam, fine sandy loam, loam, sandy clay loam, or the channery, flaggy, or gravelly analogs of those textures
Reaction—moderately acid to slightly alkaline
Roots—common fine
Clay content—18 to 35 percent
Redoximorphic features—yellow, red, or brown concentrations
Content of rock fragments, by volume—0 to 35 percent sandstone fragments (about 0 to 30 percent less than 76 millimeters in diameter and 0 to 30 percent more than 76 millimeters in diameter)
Thickness—0 to 10 inches

BC horizon (where present):
Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8
Texture—clay loam, loam, fine sandy loam, very fine sandy loam, or the gravelly, channery, or flaggy analogs of those textures
Reaction—moderately acid to slightly alkaline
Clay content—18 to 35 percent
Redoximorphic features—yellow, red, or brown concentrations
Content of rock fragments, by volume—0 to 35 percent sandstone fragments (about 0 to 30 percent than 76 millimeters in diameter and 0 to 30 more than 76 millimeters in diameter)
Thickness—0 to 16 inches

Cr horizon:
Color—hue of 2.5YR to 10YR, value of 5 or 6, and chroma of 4 to 8
Kind of bedrock—weathered sandstone

Dale Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Loamy alluvium of Pleistocene age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: High flood plains
Slope: 0 to 8 percent
Slope shape: Linear-linear
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 38 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine-silty, mixed, superactive, thermic Pachic Haplustolls

Associated Soils

These are the Brewer, Canadian, Crisfield, Lela, McLain, Port, Reinach, and Yahola soils. Brewer, Lela, and McLain soils are on landscapes similar to those of the Dale soils but are in a slightly lower position farther from the streams. They have more than 35 percent clay in the control section. Canadian, Crisfield, and Reinach soils are on the slightly higher landscapes closer to the streams. Canadian and Crisfield soils

have a mollic epipedon that is less than 20 inches thick and have a coarse-loamy control section. Port soils are on the lower landscapes.

Typical Pedon

Dale silt loam, in a cultivated area; Lincoln County, Oklahoma; about 1 mile east of Harrah; 4,000 feet south and 900 feet east of the northwest corner of sec. 30, T. 12 N., R. 2 E. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; hard, friable; many fine roots; many wormcasts; neutral; abrupt smooth boundary. (0 to 10 inches thick)

A—7 to 21 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; hard, friable; many fine roots; many wormcasts; neutral; abrupt smooth boundary. (10 to 26 inches thick)

Bw—21 to 40 inches; dark brown (10YR 4/3) silt loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to moderate medium granular; hard, friable; few fine roots; few wormcasts; slightly alkaline; gradual smooth boundary. (10 to 30 inches thick)

C—40 to 60 inches; brown (7.5YR 5/4) silt loam, dark brown (7.5YR 4/4) moist; massive; hard, friable; few fine roots; few wormcasts; few films and spots of calcium carbonate; calcareous; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 50 inches
Depth to bedrock: More than 80 inches
Depth to carbonates: 20 to 60 inches

A horizon:
Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 or 3
Texture—silt loam, loam, silty clay loam, or clay loam
Reaction—slightly acid to moderately alkaline
Roots—many fine
Clay content—15 to 35 percent
Thickness—10 to 26 inches

Bw horizon:
Color—hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 2 to 8
Texture—silt loam, loam, silty clay loam, or clay loam
Reaction—slightly acid to moderately alkaline
Roots—few fine
Clay content—18 to 35 percent
Thickness—10 to 30 inches

C horizon:
Color—hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 2 to 8
Texture—mainly silt loam, loam, silty clay loam, or clay loam; in some pedons strata of very fine sandy loam, fine sandy loam, or loamy fine sand below a depth of 50 inches
Reaction—slightly acid to moderately alkaline
Roots—few fine
Clay content—18 to 35 percent

Darsil Series

Major land resource area: Northern Cross Timbers (84A)
Depth class: Shallow
Drainage class: Excessively drained
Parent material and geologic age: Material weathered from weakly cemented sandstone of Permian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Shoulders
Slope: 1 to 45 percent
Slope shape: Convex-linear, convex-convex
Elevation: 750 to 1,200 feet
Mean annual precipitation: 30 to 38 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 48 to 64

Taxonomic class: Thermic, shallow and coated Ustic Quartzipsamments

Associated Soils

These are the Darnell, Harrah, Littleaxe, Newalla, and Stephenville soils. Darnell soils have a loamy textural control section. They are on the same landscape as the Darsil soils. Harrah soils have a fine-loamy control section, have an argillic horizon, and have a solum that is more than 60 inches thick. They are on footslopes. Littleaxe soils have a fine-loamy control section, have an argillic horizon, and have a solum that is 40 to 60 inches thick. Newalla soils have a fine textured control section, have an argillic horizon,

and have a solum that is 35 to 60 inches thick. Stephenville soils have a fine-loamy control section, have an argillic horizon, and have a solum that is 20 to 40 inches thick.

Typical Pedon

Darsil loamy fine sand, on a convex, west-facing slope of 4 percent, in a postoak-blackjack forest with an understory of native grasses; Cleveland County, Oklahoma; about 6 miles east of the intersection of U.S. Highway 77 and Alemeda Street in Norman; 700 feet east and 50 feet south of the northwest corner of sec. 32, T. 9 N., R. 1 W. (When described, the soil was moist throughout, but colors are for dry soil unless otherwise indicated.)

A1—0 to 5 inches; brown (7.5YR 5/2) loamy fine sand, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable; slightly acid; clear smooth boundary. (3 to 9 inches thick)

AC—5 to 17 inches; pink (7.5YR 7/4) fine sand, brown (7.5YR 5/4) moist; weak fine granular structure; soft, very friable; 2 percent, by volume, rock fragments from 2 to 76 millimeters in diameter; neutral; clear wavy boundary. (6 to 15 inches thick)

Cr—17 to 23 inches; red (2.5YR 5/8), weakly cemented, fine grained sandstone, red (2.5YR 4/8) moist; moderately acid.

Range in Characteristics

Thickness of the solum: 10 to 20 inches
Depth to bedrock: 10 to 20 inches

A horizon:
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 4
Texture—loamy fine sand
Reaction—strongly acid to slightly alkaline
Clay content—1 to 10 percent
Thickness—3 to 9 inches

AC horizon:
Color—hue of 2.5YR to 10YR, value of 6 or 7, and chroma of 3 to 6
Texture—loamy fine sand or fine sand
Reaction—strongly acid to slightly alkaline
Clay content—1 to 10 percent
Content of rock fragments, by volume—0 to 20 percent of sandstone fragments from 2 to 76 millimeters in diameter
Thickness—6 to 15 inches

Cr horizon:
Color—hue of 2.5YR or 5YR, value of 3 to 6, and chroma of 4 to 8
Kind of bedrock—weathered, weakly cemented, fine grained sandstone

Derby Series

Major land resource area: Northern Cross Timbers (84A) and Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Somewhat excessively drained
Parent material and geologic age: Sandy eolian sediments of Pleistocene age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Dune fields
Secondary landform: Dunes
Slope: 0 to 35 percent
Slope shape: Convex-convex
Elevation: 800 to 1,300 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 63 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Mixed, thermic Lamellic Ustipsamments

Associated Soils

These are the competing Goodnight soils and the Amber, Gaddy, Minco, Paluxy, and Yahola soils. Amber soils have a coarse-silty control section. They are on flood plains. Gaddy soils are stratified and have an irregular decrease in content of organic matter. They are on flood plains. Goodnight soils do not have lamellae. Minco and Paluxy soils are on landscapes similar to those of the Derby soils. Minco soils have a mollic epipedon and a coarse-silty control section. Paluxy soils have a coarse-loamy control section. Yahola soils have a coarse-loamy control section and an irregular decrease in content of organic matter. They are on flood plains.

Typical Pedon

Derby fine sandy loam, savannah; Payne County, Oklahoma; about 3 miles west and 3 miles south of Yale; 2,200 feet south and 200 feet west of the northeast corner of sec. 3, T. 18 N., R. 5 E. (Colors are for dry soil unless otherwise indicated.)

A1—0 to 9 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable; neutral; clear smooth boundary. (4 to 24 inches thick)

A2—9 to 20 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 4/4) moist; single grained; loose; moderately acid; clear smooth boundary. (0 to 42 inches thick)

E1—20 to 54 inches; pink (7.5YR 7/4) fine sand, brown (7.5YR 5/4) moist; single grained; loose; slightly acid; diffuse smooth boundary. (16 to 48 inches thick)

E2 and Bt1—54 to 72 inches; reddish yellow (7.5YR 6/6) fine sand, strong brown (7.5YR 5/6) moist (E2); single grained; loose; lamellae of yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6) moist (Bt1), which are massive, soft, very friable, 2 to 15 centimeters apart and 2 to 10 millimeters thick, and discontinuous horizontally; neutral in the E part and slightly acid in the lamellae; diffuse smooth boundary. (18 to 36 inches thick)

E3 and Bt2—72 to 120 inches; pink (7.5YR 7/4) fine sand, light brown (7.5YR 6/4) moist (E3); single grained; loose; lamellae of yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6) moist (Bt2), which are massive, soft, very friable, 5 to 15 centimeters apart and 2 to 12 millimeters thick, and continuous horizontally; neutral.

Range in Characteristics

Thickness of the solum: More than 60 inches
Depth to bedrock: More than 80 inches
Depth to lamellae: 44 to 60 inches
Other features: Where the surface layer is fine sandy loam, the total thickness of the Ap and/or A1 horizons is not more than 25 centimeters or the depth of the Ap horizon, whichever is deeper.

Ap or A1 horizon:
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 4
Texture—fine sandy loam or loamy fine sand
Reaction—moderately acid to slightly alkaline
Clay content—2 to 10 percent
Thickness—4 to 24 inches

A2 horizon:
Color—hue of 5YR to 10YR, value of 5 to 7, and chroma of 3 or 4
Texture—fine sand or loamy fine sand
Reaction—moderately acid to slightly alkaline
Clay content—1 to 10 percent
Thickness—0 to 42 inches

E1 horizon:
Color—hue of 5YR to 10YR, value of 6 or 7, and chroma of 4 to 8
Texture—fine sand or loamy fine sand
Reaction—moderately acid to slightly alkaline
Clay content—1 to 10 percent
Thickness—16 to 48 inches

The E2 and E3 parts of the E2 and Bt1 horizon and of the E3 and Bt2 horizon:
Color—hue of 5YR to 10YR, value of 6 to 8, and chroma of 4 to 8
Texture—loamy fine sand or fine sand
Reaction—moderately acid to moderately alkaline
Clay content—1 to 10 percent

The Bt1 and Bt2 parts of the E2 and Bt1 horizon and of the E3 and Bt2 horizon:
Color—hue of 2.5YR or 5YR, value of 4 to 7, and chroma of 4 to 8
Texture—mainly loamy fine sand, but also fine sand and fine sandy loam
Reaction—moderately acid to moderately alkaline
Clay content—1 to 10 percent
Thickness of the lamellae— 1 to 25 millimeters (The lamellae that are more than 10 millimeters thick do not reach a cumulative total of 15 centimeters within a depth of 60 inches; they generally are 2 to 20 centimeters apart.)

C horizon (where present):
Color—hue of 7.5YR, value of 6 or 7, and chroma of 6 to 8
Texture—loamy fine sand or fine sand
Reaction—moderately acid to moderately alkaline
Clay content—1 to 10 percent

Dougherty Series

Major land resource area: Northern Cross Timbers (84A)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Sandy and loamy sediments on terraces of Pleistocene age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Upland terraces
Landform: Dune fields
Position: Dunes and interdune areas
Slope: 0 to 20 percent
Slope shape: Convex-convex, linear-convex
Elevation: 800 to 1,300 feet
Mean annual precipitation: 30 to 38 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 48 to 64

Taxonomic class: Loamy, mixed, active, thermic Arenic Haplustalfs

Associated Soils

These are the Bastrop, Derby, Eufaula, Konawa, Larton, Slaughterville, Stidham, and Teller soils. Bastrop, Larton, and Stidham soils are on the higher terraces. Bastrop soils have an argillic horizon that decreases less than 20 percent in clay content from the maximum within a depth of 60 inches. Derby and Slaughterville soils are in areas of recent eolian sediments. Eufaula soils are sandy. They are in the slightly higher positions. Konawa and Teller soils are in the slightly lower positions on the more stable landscapes.

Typical Pedon

Dougherty loamy fine sand, in a cultivated area; Payne County, Oklahoma; about 9 miles south and 8 miles west of Stillwater, along State Highway 33; 2,375 feet west and 50 feet south of the northeast corner of sec. 3, T. 17 N, R. 1 E. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 6 inches; grayish brown (10YR 5/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable; slightly acid; clear smooth boundary. (0 to 9 inches thick)

E—6 to 26 inches; very pale brown (10YR 7/3) loamy fine sand, brown (10YR 5/3) moist; single grained; soft, very friable; moderately acid; clear smooth boundary. (13 to 36 inches thick)

Bt—26 to 42 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate coarse prismatic structure parting to weak medium subangular blocky; very hard, friable; clay films on faces of peds and bridging between sand grains; moderately acid; diffuse smooth boundary. (10 to 25 inches thick)

BC—42 to 54 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure; hard, friable; moderately acid; diffuse smooth boundary. (10 to 30 inches thick)

C—54 to 70 inches; yellowish red (5YR 5/8) loamy fine sand, yellowish red (5YR 4/8) moist; massive; slightly hard, friable; moderately acid.

Range in Characteristics

Thickness of the solum: 45 to more than 72 inches
Depth to bedrock: More than 60 inches
Combined thickness of the A and E horizons: 20 to 40 inches

Ap or A horizon:
Color—hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 2 to 4
Texture—loamy fine sand or fine sand
Reaction—slightly acid to strongly acid
Clay content—2 to 10 percent
Thickness—0 to 9 inches

E horizon:
Color—hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 2 to 4
Texture—loamy fine sand or sand
Reaction—slightly acid to strongly acid
Clay content—2 to 10 percent
Thickness—13 to 36 inches

Bt horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 7, and chroma of 4 to 8
Texture—fine sandy loam or sandy clay loam
Reaction—slightly acid to strongly acid
Clay content—18 to 35 percent
Thickness—10 to 25 inches

BC horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 7, and chroma of 4 to 8
Texture—fine sandy loam, sandy clay loam, or loamy fine sand
Reaction—slightly acid to strongly acid
Clay content—12 to 25 percent
Thickness—10 to 30 inches

C horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 7, and chroma of 4 to 8
Texture—fine sandy loam or loamy fine sand
Reaction—neutral to strongly acid
Clay content—2 to 15 percent

Easpur Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Loamy alluvium of Recent age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Low flood plains
Slope: 0 to 1 percent
Slope shape: Linear-linear
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 38 inches
Mean annual air temperature: 58 to 63 degrees F
Frost-free days: 200 to 230

Thornthwaite PE index: 44 to 64

Taxonomic class: Fine-loamy, mixed, superactive, thermic Fluventic Haplustolls

Associated Soils

These are the Dale, Port, and Pulaski soils. Dale and Port soils have a mollic epipedon that is more than 20 inches thick and have a fine-silty control section. Dale soils are on the slightly higher landscapes and are rarely flooded. Port soils are on landscapes similar to those of the Easpur soils. Pulaski soils are typically closer to the stream channels than the Easpur soils. They have a coarse-loamy control section and do not have a mollic epipedon.

Typical Pedon

Easpur loam, in a cultivated area; Payne County, Oklahoma; about one-half mile west of Stillwater, Oklahoma; 2,000 feet east and 1,300 feet north of the southwest corner of sec. 16, T. 19 N., R. 2 E. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 11 inches; reddish brown (5YR 4/3) loam, dark reddish brown (5YR 3/3) moist; weak fine granular structure; slightly hard, friable; many fine roots; slightly acid; clear smooth boundary. (8 to 14 inches thick)

Bw1—11 to 19 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine granular structure; soft, very friable; many fine roots; neutral; clear smooth boundary. (6 to 24 inches thick)

Bw2—19 to 29 inches; reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; moderate fine granular structure; hard, firm; few fine roots; neutral; clear smooth boundary. (0 to 24 inches thick)

C—29 to 41 inches; stratified reddish brown (5YR 5/4) loam, yellowish red (5YR 5/6) fine sandy loam, and reddish brown (5YR 4/3) clay loam; massive; slightly hard, friable; few fine roots; strata are 1 to 4 inches thick; slightly alkaline; clear smooth boundary. (0 to 33 inches thick)

2Ab—41 to 62 inches; dark reddish gray (5YR 4/2) silty clay loam, dark reddish brown (5YR 3/2) moist; moderate fine granular structure; hard, firm; slightly alkaline; clear smooth boundary. (10 to 21 inches thick)

2Bwb—62 to 72 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; hard, firm; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: Less than 20 inches
Thickness of the solum: 20 to more than 60 inches
Depth to a buried horizon: 20 to more than 60 inches
Depth to carbonates (where present): More than 50 inches
Depth to bedrock: More than 80 inches

Ap or A horizon:
Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3
Texture—loam or silt loam
Reaction—moderately acid to moderately alkaline
Roots—many fine
Clay content—12 to 26 percent
Thickness—8 to 14 inches

Bw horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 3 to 6
Texture—loam, clay loam, fine sandy loam, or very fine sandy loam
Reaction—slightly acid to moderately alkaline
Roots—few to many fine
Clay content—18 to 35 percent
Thickness—6 to 48 inches

C horizon:
Color—hue of 2.5YR to 10YR, value of 4 to 7, and chroma of 3 to 6
Texture—stratified fine sandy loam to clay loam
Reaction—slightly acid to moderately alkaline
Roots—few fine
Clay content—18 to 35 percent
Thickness—0 to 33 inches

2Ab horizon:
Color—hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 2 or 3
Texture—silt loam, silty clay loam, clay loam, or loam
Reaction—slightly acid to moderately alkaline
Clay content—18 to 35 percent
Thickness—10 to 21 inches

2Bwb horizon:
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 to 4
Texture—silt loam, silty clay loam, clay loam, or loam
Reaction—slightly acid to moderately alkaline
Clay content—18 to 35 percent

Gaddy Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Somewhat excessively drained
Parent material and geologic age: Recent sandy alluvium
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Low flood plains
Slope: 0 to 2 percent
Slope shape: Linear-linear
Elevation: 700 to 1,500 feet
Mean annual air temperature: 57 to 70 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Sandy, mixed, thermic Udic Ustifluvents

Associated Soils

These are the Gracemore and Yahola soils. Gracemore soils are in the lower areas nearest the stream channels. Yahola soils generally are in higher areas. They have textures finer than loamy fine sand in the textural control section.

Typical Pedon

Gaddy loamy fine sand; Pottawatomie County, Oklahoma; about 2 miles east and 1 mile south of Shawnee; about 2,100 feet west and 200 feet south of the northeast corner of sec. 28, T. 10 N., R. 4 E. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 8 inches; brown (7.5YR 5/4) loamy fine sand, brown (7.5YR 4/4) moist; weak fine granular structure; slightly hard, very friable; calcareous; moderately alkaline; clear smooth boundary.
C1—8 to 20 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; single grained; soft; common thin strata of brown (7.5YR 4/4) fine sandy loam; calcareous; moderately alkaline; gradual smooth boundary.
C2—20 to 60 inches; very pale brown (10YR 7/3) fine sand, pale brown (10YR 6/3) moist; single grained; loose; common thin strata of brown (10YR 5/3) loamy fine sand and fine sandy loam; calcareous; moderately alkaline.

Range in Characteristics

Depth to effervescence: 0 to 10 inches

A horizon:
Color—hue of 5YR, 7.5YR, or 10YR, value of 4 to 6 (3 to 5 moist), and chroma of 2 to 6. (Where the moist color value and chroma are less than 3.5, the thickness is less than 10 inches or the content of organic matter is less than 1 percent.)
Texture—fine sand to silt loam in the upper 10 inches and loamy fine sand or fine sand below a depth of 10 inches
Reaction—moderately alkaline or slightly alkaline and calcareous

C horizon:
Color—hue of 5YR, 7.5YR, or 10YR, value of 6 to 8 (5 to 7 moist), and chroma of 3 to 6
Texture—loamy fine sand or fine sand with thin strata of fine sandy loam to clay loam
Reaction—moderately alkaline and calcareous

Gracemont Series

Major land resource area: Central Rolling Red Plains (78C) and Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Somewhat poorly drained
Parent material and geologic age: Calcareous, loamy alluvium of Recent age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Low flood plains
Slope: 0 to 2 percent
Slope shape: Linear-linear/concave
Mean annual precipitation: 24 to 40 inches
Mean annual air temperature: 57 to 68 degrees F
Frost-free days: 185 to 230
Thornthwaite PE index: 34 to 64

Taxonomic class: Coarse-loamy, mixed, calcareous, thermic Oxyaquic Udifluvents

Associated Soils

These are the Clairemont, Gracemore, Lincoln, and Westola soils. Clairemont soils have more than 18 percent clay in the textural control section. Gracemore and Lincoln soils are fine sand or loamy fine sand below a depth of 10 inches. Lincoln and Westola soils are dry for longer periods than the Gracemont soils and do not have a water table within a depth of 40 inches.

Typical Pedon

Gracemont fine sandy loam; Caddo County,

Oklahoma; 1 mile north of Gracemont; 855 feet north and 90 feet east of the southwest corner of SE1/4 sec. 33, T. 9 N., R. 10 W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 14 inches; dark reddish brown (5YR 3/4) fine sandy loam; weak fine granular structure; slightly hard, very friable; calcareous; moderately alkaline; clear smooth boundary.

C1—14 to 34 inches; dark red (2.5YR 3/6) fine sandy loam; massive; slightly hard, friable; strata of darker loam that are as much as 3 inches thick and are separated from the mass by evident bedding planes; a few soft bodies of calcium carbonate; calcareous; moderately alkaline; a water table at a depth of 24 inches; clear smooth boundary.

C2—34 to 46 inches; dark reddish brown (5YR 3/4) fine sandy loam; massive; very friable; highly stratified with browner material; common soft bodies of calcium carbonate; calcareous; moderately alkaline; clear smooth boundary.

Ab—46 to 64 inches; very dark brown (10YR 2/2) loam; massive; friable; common soft bodies of calcium carbonate; calcareous; moderately alkaline.

Range in Characteristics

Depth to effervescence: 0 to 10 inches
Depth to a fluctuating water table: 6 to 36 inches

A horizon:
Color—hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 2 to 6. (Where the moist chroma and value are less than 3.5, the thickness is less than 10 inches.)
Texture—loamy fine sand, fine sandy loam, loam, or clay loam in the upper 10 inches and fine sandy loam or loam below a depth of 10 inches
Reaction—neutral to moderately alkaline and calcareous

C horizon:
Color—hue of 2.5YR to 10YR, value of 3 to 6, and chroma of 3 to 8
Texture—fine sandy loam, very fine sandy loam, or loam with thin strata of coarser or finer textured material
Reaction—moderately alkaline and calcareous

Ab horizon (where present):
Color—hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 4
Texture—fine sandy loam or loam; also, clay loam below a depth of 40 inches
Reaction—moderately alkaline and calcareous

Gracemore Series

Major land resource area: Central Rolling Red Plains (78C) and Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Somewhat poorly drained
Parent material and geologic age: Calcareous, sandy alluvium of Recent age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Low flood plains
Slope: 0 to 3 percent
Slope shape: Linear-linear/concave
Elevation: 700 to 1,300 feet
Mean annual precipitation: 24 to 38 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free days: 190 to 230
Thornthwaite PE index: 34 to 64

Taxonomic class: Sandy, mixed, thermic Oxyaquic Udifluvents

Associated Soils

These are the Daycreek, Ezell, Gaddy, Goodnight, Gracemont, Heman, Jester, Lincoln, Port, Westola, and Yahola soils. Daycreek soils are in areas adjacent to flood plains. They do not have an irregular decrease in content of organic matter. Ezell soils have a water table within a depth of 12 inches and are ponded for long periods. Gaddy, Lincoln, Westola, and Yahola soils are in the slightly higher positions. They do not have a water table within 40 inches of the surface most of the year and are dry for longer periods than the Gracemore soils. Westola and Yahola soils have horizons of fine sandy loam below a depth of 10 inches. Goodnight and Jester soils formed in eolian sediments in dune areas. They do not have a water table. Gracemont soils have horizons of fine sandy loam below a depth of 10 inches. They are in landscape positions similar to those of the Gracemore soils. Heman soils are in the slightly higher areas. They have strongly contrasting particle-size classes in the control section. Port soils have a mollic epipedon and a fine-silty control section and do not have a water table within 40 inches of the surface.

Typical Pedon

Gracemore loamy fine sand; Canadian County, Oklahoma; about 12 miles west and 6 miles south of El Reno; 600 feet north and 300 feet west of the southeast corner of sec. 5, T. 11 N., R. 9 W. (Colors are for moist soil unless otherwise indicated.)

A—0 to 12 inches; dark brown (7.5YR 4/4) loamy fine sand, brown (7.5YR 5/4) dry; weak fine granular structure; soft, very friable; many fine roots; calcareous; moderately alkaline; clear smooth boundary.

C—12 to 72 inches; brown (7.5YR 5/4) fine sand, pink (7.5YR 6/4) dry; single grained; loose, very friable; very thin to 1-inch strata of darker colored fine sandy loam and clay loam that decrease in number as depth increases; bedding planes are evident; calcareous; moderately alkaline.

Range in Characteristics

Content of rock fragments, by volume, throughout the profile: 0 to 10 percent rounded gravel as much as 3 inches in diameter
Depth to carbonates: 0 to 10 inches
Depth to a fluctuating water table: 6 to 36 inches

A horizon:
Color—hue of 5YR to 10YR, value of 3 to 7 (4 to 8 dry), and chroma of 1 to 6. (Where the moist color value and chroma are 3 or less, the horizon is less than 10 inches thick.)
Texture—fine sand, loamy fine sand, fine sandy loam, loam, clay loam, or very fine sandy loam in the upper 10 inches and loamy fine sand or fine sand below a depth of 10 inches
Reaction—moderately or slightly alkaline and calcareous
Salinity—electrical conductivity of 0 to 16 mmhos/cm in the saturation extract

C horizon:
Color—hue of 5YR to 10YR, value of 4 to 7 (5 to 8 dry), and chroma of 2 to 6. (The finer strata are darker and contain more organic carbon than the mass of the horizon.)
Texture—loamy fine sand or fine sand with thin strata of fine sandy loam to clay loam
Reaction—moderately alkaline and calcareous
Salinity—electrical conductivity of 0 to 16 mmhos/cm in the saturation extract

Grainola Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Moderately deep
Drainage class: Well drained
Parent material and geologic age: Material weathered from shale of Recent age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Shoulders and backslopes
Slope: 1 to 25 percent
Slope shape: Linear-convex
Elevation: 800 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Frost-free days: 200 to 220
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine, mixed, active, thermic Udertic Haplustalfs

Associated Soils

These are the Apperson, Aydelotte, Corbin, Foraker, Kiti, Lucien, Masham, Piedmont, Renfrow, Renthin, Shidler, and Tamford soils. Apperson, Aydelotte, Corbin, Foraker, and Renfrow soils are mainly on the slightly higher broad ridges. Apperson, Corbin, and Renfrow soils have a mollic epipedon. Aydelotte soils have a solum that is more than 60 inches thick. Foraker soils have smectitic mineralogy. Kiti, Lucien, and Shidler soils are less than 20 inches deep, do not have an argillic horizon, and have a mollic epipedon. They are on ridgetops. Masham soils are less than 20 inches deep. They typically are in the slightly lower areas. Piedmont and Renthin soils have a mollic epipedon. They typically are in the slightly higher, smoother areas. Tamford soils do not have an argillic horizon. They are on foot slopes.

Typical Pedon

Grainola silty clay loam, in an area of rangeland; Osage County, Oklahoma; about 4 miles west and 3 miles north of Shidler; 1,060 feet east and 280 feet south of the northwest corner of sec. 14, T. 27 N., R. 5 E. (Colors are for dry soil unless otherwise indicated.)

Ak—0 to 6 inches; reddish brown (5YR 4/3) very gravelly silty clay loam, dark reddish brown (5YR 3/3) moist; strong medium granular structure; hard, friable; about 25 percent, by volume, flat limestone fragments from 2 to 76 millimeters in diameter and 10 percent, by volume, flat limestone fragments more than 76 millimeters in diameter; about 5 percent calcium carbonate concretions from 2 to 76 millimeters in diameter; calcareous; moderately alkaline; clear smooth boundary. (4 to 10 inches thick)

BAk—6 to 13 inches; reddish brown (5YR 5/3) silty clay loam, reddish brown (5YR 4/3) moist; moderate medium granular structure; hard, firm; about 7 percent, by volume, flat limestone

fragments from 2 to 76 millimeters in diameter; about 5 percent calcium carbonate concretions from 2 to 76 millimeters in diameter; calcareous; moderately alkaline; gradual smooth boundary. (0 to 10 inches thick)

Btk1—13 to 28 inches; reddish brown (2.5YR 4/4) silty clay, dark reddish brown (2.5YR 3/4) moist; common fine light olive gray spots of weathered shale; weak medium blocky structure; very hard, very firm; nearly continuous clay films or pressure faces on peds; about 5 percent, by volume, sandstone fragments from 2 to 76 millimeters in diameter; few calcium carbonate concretions; few masses of calcium carbonate; calcareous; moderately alkaline; clear wavy boundary. (8 to 16 inches thick)

Btk2—28 to 36 inches; reddish brown (2.5YR 4/4) very gravelly silty clay, dark reddish brown (2.5YR 3/4) moist; weak medium blocky structure; very hard, very firm; patchy clay films on faces of peds; about 40 percent, by volume, dark reddish brown and olive gray shale fragments from 2 to 76 millimeters in diameter; few calcium carbonate concretions; common masses of calcium carbonate; calcareous; moderately alkaline; clear wavy boundary. (0 to 16 inches thick)

Cr—36 to 42 inches; weak red (2.5YR 5/2) shale bedrock; laminated; calcium carbonate films on faces of some fragments; calcareous.

Range in Characteristics

Thickness of the ochric epipedon: 4 to 10 inches
Thickness of the solum: 20 to 40 inches
Depth to bedrock: 20 to 40 inches

A horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 2 to 4
Texture—silt loam, loam, silty clay loam, clay loam, or the gravelly, cobbly, bouldery, or stony analogs of those textures
Reaction—neutral to moderately alkaline
Clay content—15 to 35 percent
Content of rock fragments, by volume—0 to 55 percent fragments of hard limestone or sandstone (0 to 35 percent less than 76 millimeters in diameter, 0 to 20 percent 76 to 250 millimeters in diameter, and 0 to 20 percent 250 to 375 millimeters in diameter)

BA horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 2 to 4
Texture—silty clay loam, clay loam, clay, silty clay, or the gravelly, cobbly, stony, or bouldery analogs of those textures
Reaction—moderately alkaline and calcareous
Clay content—35 to 60 percent
Content of rock fragments, by volume—0 to 55 percent fragments of hard limestone or sandstone (0 to 35 percent less than 76 millimeters in diameter, 0 to 20 percent 76 to 250 millimeters in diameter, and 0 to 20 percent 250 to 375 millimeters in diameter)

Btk1 horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 to 8
Texture—silty clay loam, clay loam, clay, or silty clay
Reaction—moderately alkaline and calcareous
Clay content—35 to 60 percent
Content of rock fragments, by volume—0 to 15 percent soft shale fragments that are less than 76 millimeters in diameter and that slake in water within 15 hours

Btk2 horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 2 to 8
Texture—clay loam, silty clay loam, clay, silty clay, or the gravelly or very gravelly analogs of those textures
Reaction—moderately alkaline and calcareous
Clay content—35 to 60 percent
Content of rock fragments, by volume—5 to 45 percent soft shale fragments that are less than 76 millimeters in diameter and that slake in water within 15 hours
Carbonates—0 to 10 percent, by volume, masses of calcium carbonate

BC horizon (where present):
Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 2 to 8
Texture—clay loam, silty clay loam, clay, silty clay, or the gravelly, very gravelly, or extremely gravelly analogs of those textures
Reaction—moderately alkaline and calcareous
Clay content—35 to 60 percent
Content of rock fragments, by volume—5 to 70 percent soft shale fragments that are less than 76 millimeters in diameter and that slake in water within 15 hours
Carbonates—0 to 10 percent, by volume, masses of calcium carbonate

Cr horizon:
Color—hue of 10R to 5YR, value of 3 to 5, and

chroma of 2 to 6; in some pedons streaked or spotted with shades of grayish, brownish, yellowish, or olive colors

Kind of bedrock—weathered shale and thin strata of sandstone and limestone; high or very high excavation difficulty

Grant Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Deep
Drainage class: Well drained
Parent material and geologic age: Material weathered from silty sandstone or silty shale of Permian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Dissected terraces
Position: Summits, shoulders, and backslopes
Slope: 0 to 20 percent
Slope shape: Linear-linear/convex
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 38 inches
Mean annual air temperature: 57 to 65 degrees F
Frost-free days: 190 to 220
Thornthwaite PE index: 44 to 60

Taxonomic class: Fine-silty, mixed, superactive, thermic Udic Argiustolls

Associated Soils

These are the Bethany, Lucien, Nash, Nashville, Norge, and Pond Creek soils. Bethany soils have more than 35 percent clay in the textural control section. Lucien, Nash, and Nashville soils do not have an argillic horizon and have bedrock within 40 inches of the surface. They are on sideslopes. Norge and Pond Creek soils are in the lower positions, the Norge soils on sideslopes and the Pond Creek soils on broad flats.

Typical Pedon

Grant silt loam; Garfield County, Oklahoma; about 2 miles north and 6$^{1}/_{2}$ miles west of Hillsdale; 500 feet south and 100 feet east of the northwest corner of sec. 6, T. 24 S., R. 8 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 7 inches; brown (7.5YR 5/2) silt loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; slightly hard, very friable; many fine roots; slightly acid; clear smooth boundary.

A—7 to 12 inches; brown (7.5YR 4/2) silt loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; slightly hard, very friable; many fine roots; slightly acid; gradual smooth boundary.

AB—12 to 16 inches; reddish brown (5YR 4/3) silt loam, dark reddish brown (5YR 3/3) moist; moderate medium granular structure; slightly hard, very friable; many fine roots; neutral; gradual smooth boundary.

Bt—16 to 32 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable; common fine roots; clay films on faces of peds; neutral; gradual smooth boundary.

BC—32 to 47 inches; yellowish red (5YR 5/6) silt loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; hard, friable; few fine roots; mildly alkaline; gradual smooth boundary.

C—47 to 59 inches; yellowish red (5YR 5/6) silt loam, yellowish red (5YR 4/6) moist; massive; hard, friable; few fine roots; common medium fragments of sandstone; calcareous; moderately alkaline; clear smooth boundary.

Cr—59 to 72 inches; red (2.5YR 5/6), weakly consolidated sandstone, red (2.5YR 4/6) moist; calcareous in seams.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Depth to bedrock: 40 to 60 inches
Depth to carbonates: 30 to 60 inches

A horizon:
Color—hue of 5YR to 10YR, value of 4 or 5 (3 moist), and chroma of 2 or 3
Texture—silt loam, very fine sandy loam, or loam
Reaction—slightly acid to slightly alkaline

AB or BA horizon (where present):
Color—hue of 2.5YR to 7.5YR, value of 4 or 5 (3 or 4 moist), and chroma of 2 to 4
Texture—silt loam, very fine sandy loam, or loam
Reaction—slightly acid to slightly alkaline

Bt horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 or 5 (3 or 4 moist), and chroma of 2 to 8
Texture—silt loam, loam, very fine sandy loam, silty clay loam, or clay loam
Reaction—slightly acid to moderately alkaline; calcareous in the lower part in some pedons
Clay content—18 to 35 percent

BC horizon:
Color—hue of 2.5YR or 5YR, value of 4 to 6 (3 to 5 moist), and chroma of 4 to 8

Texture—silt loam, loam, very fine sandy loam, silty clay loam, or clay loam
Reaction—neutral to moderately alkaline; calcareous in some pedons

C horizon:
Color—hue of 2.5YR or 5YR, value of 4 to 7 (3 to 6 moist), and chroma of 4 to 8
Texture—silt loam, loam, or very fine sandy loam
Reaction—slightly alkaline or moderately alkaline; noncalcareous in some pedons
Content of rock fragments, by volume—0 to 20 percent sandstone fragments 5 millimeters to 1 inch in diameter

Cr horizon:
Kind of bedrock—soft, reddish silty sandstone or silty shale
Reaction—slightly alkaline or moderately alkaline; may or may not be calcareous
Hardness—mainly nonparalithic material with a low or moderate excavation difficulty but some paralithic layers with a high excavation difficulty; a moist bulk density of 1.85 to more than 2.0 gm/cm^3

Harrah Series

Major land resource area: Northern Cross Timbers (84A)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Sandy and loamy colluvial material weathered from sandstone of Permian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Footslopes
Slope: 3 to 8 percent
Slope shape: Concave-linear
Elevation: 1,000 to 1,300 feet
Mean annual precipitation: 30 to 38 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free days: 190 to 220
Thornthwaite PE index: 48 to 64

Taxonomic class: Fine-Loamy, siliceous, active, thermic Ultic Paleustalfs

Associated Soils

These are the Darnell, Darsil, Pulaski, Stephenville, and Tribbey soils. Darnell and Darsil soils do not have an argillic horizon and are less than 20 deep over sandstone. They are mainly on ridge crests. Pulaski and Tribbey soils are on flood plains. They do not have an argillic horizon, have an irregular decrease in content of organic carbon, and have a coarse-loamy control section. In addition, Tribbey soils have a water table within 40 inches of the surface most of the time. Stephenville soils are in the slightly higher areas. They have a solum that is less than 40 inches thick.

Typical Pedon

Harrah fine sandy loam, on a convex, east-facing slope of 6 percent, in a severely eroded field reseeded to native grasses; Cleveland County, Oklahoma; about 10 miles east and 2.6 miles north of the intersection of U.S. Highway 77 and Robinson Street in Norman; about 2,350 feet south and 900 feet east of the northwest corner of sec. 12, T. 9 N., R. 1 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 9 inches; brown (7.5YR 5/2) fine sandy loam, dark brown (7.5YR 4/2) moist; weak fine granular structure; soft, very friable; neutral; clear smooth boundary. (2 to 10 inches thick)

E—9 to 19 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; weak fine granular structure; soft, very friable; neutral; clear smooth boundary. (0 to 20 inches thick)

Bt1—19 to 34 inches; red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; weak fine blocky structure; hard, firm; thin nearly continuous clay films on faces of peds; slightly acid; gradual wavy boundary. (10 to 25 inches thick)

Bt2—34 to 52 inches; red (2.5YR 5/8) sandy clay loam, red (2.5YR 4/8) moist; moderate medium prismatic structure parting to moderate medium blocky; hard, firm; thin nearly continuous clay films on faces of peds; about 5 percent, by volume, uncoated sand grains on vertical faces of peds and in pores; moderately acid; gradual wavy boundary. (12 to 45 inches thick)

Btb1—52 to 76 inches red (2.5YR 4/6) sandy clay loam, dark red (2.5YR 3/6) moist; moderate medium prismatic structure parting to moderate medium blocky; hard, firm; thin continuous clay films on faces of peds; about 20 percent, by volume, uncoated sand grains on vertical faces of peds and in pores; moderately acid; gradual wavy boundary. (0 to 28 inches thick)

Btb2—76 to 86 inches; red (2.5YR 4/6) sandy clay loam, dark red (2.5YR 3/6) moist; moderate medium blocky structure; hard, firm; thin continuous clay films on faces of peds; few fine dark concretions; about 10 percent, by volume,

uncoated sand grains on vertical faces of peds and in pores; slightly acid.

Range in Characteristics

Thickness of the solum: More than 60 inches

Ap or A horizon:
Color—hue of 5YR or 10YR, value of 4 to 6, and chroma of 2 to 4
Texture—fine sandy loam or loamy fine sand
Reaction—very strongly acid to neutral
Clay content—5 to 18 percent

E horizon:
Color—hue of 2.5YR to 7.5YR, value of 5 to 7, and chroma of 4 to 6
Texture—fine sandy loam or loamy fine sand
Reaction—very strongly acid to neutral
Clay content—5 to 18 percent

Bt horizon:
Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 4 to 8
Texture—sandy clay loam or fine sandy loam
Reaction—very strongly acid to neutral
Clay content—18 to 35 percent

Btb horizon:
Color—hue of 10R or 2.5YR, value of 4 to 6, and chroma of 4 to 8
Texture—fine sandy loam or sandy clay loam
Reaction—very strongly acid to neutral
Clay content—18 to 35 percent

Hibsaw Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Poorly drained
Parent material and geologic age: Loamy and clayey alluvium of Pleistocene age
Landform: Low flood plains
Slope: 0 to 1 percent
Slope shape: Linear-linear
Elevation: 800 to 1,100 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free days: 190 to 230
Thornthwaite PE index: 46 to 58

Taxonomic class: Fine-silty, mixed, superactive, nonacid, thermic Aeric Halaquepts

Associated Soils

These are the Ashport, Easpur, Lawrie, Lomill, Miller, Pulaski, and Tribbey soils. Ashport, Easpur, Lawrie, Miller, and Pulaski soils do not have a water table. Ashport, Easpur, Lawrie, Lomill, and Miller soils have a mollic epipedon. Lawrie soils are farther from the stream channels than the Hibsaw soils, and Pulaski soils are closer. Pulaski and Tribbey soils have a coarse-loamy control section. Lomill soils have a textural control section that is clayey over loamy.

Typical Pedon

Hibsaw silty clay loam, 0 to 1 percent slopes, in a bermudagrass pasture; Oklahoma County, Oklahoma; about 3 miles east and 2 miles north of Arcadia, Oklahoma; 600 feet south and 150 feet west of the northeast corner of sec. 14, T. 14 N., R. 1 E. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 8 inches; reddish brown (5YR 4/3) silty clay loam, dark reddish brown (5YR 3/3) moist; weak medium platy structure parting to moderate medium and fine granular; hard, friable; many very fine and few fine roots; many very fine pores; slightly alkaline; clear smooth boundary. (5 to 9 inches thick)

Bw—8 to 18 inches; reddish brown (5YR 5/4) silt loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure parting to moderate medium granular; very hard, firm; many very fine and few fine roots; common fine pores; moderately alkaline; clear smooth boundary. (5 to 18 inches thick)

Ck—18 to 30 inches; yellowish red (2.5YR 4/6) silty clay loam, yellowish red (2.5YR 3/6) moist; massive; hard, firm; common very fine roots; common fine pores; moderately alkaline; clear wavy boundary. (0 to 14 inches thick)

C1—30 to 55 inches; yellowish red (2.5YR 6/6), stratified silt loam, yellowish red (2.5YR 5/6) moist; massive; slightly hard, firm; few very fine roots; moderately alkaline; clear smooth boundary. (0 to 29 inches thick)

C2—55 to 74 inches; reddish brown (5YR 4/4), stratified silty clay, dark reddish brown (5YR 3/4) moist; massive; very hard, very firm; few very fine roots; moderately alkaline; clear smooth boundary. (0 to 24 inches thick)

Ab—74 to 96 inches; reddish brown (5YR 4/3) silty clay loam, dark reddish brown (5YR 3/3) moist; weak medium subangular blocky structure parting to moderate medium granular; hard, firm; few very fine roots; moderately alkaline.

Range in Characteristics

Thickness of the solum: 12 to more than 25 inches
Depth to bedrock: More than 60 inches

Depth to carbonates: 18 to 30 inches
Depth to a buried horizon: 45 to 74 inches
Water table: 18 above to 36 inches below the surface

Ap or A horizon:
Color—hue of 5YR, value of 4 or 5, and chroma of 2 or 3
Texture—very fine sandy loam, loam, silty clay loam, or silty clay
Reaction—slightly alkaline or moderately alkaline
Roots—many very fine and few fine
Pores—many very fine
Clay content—10 to 40 percent
Thickness—5 to 9 inches

Bw horizon:
Color—hue of 5YR, value of 4 or 5, and chroma of 4 to 6
Texture—loam, silt loam, or silty clay
Reaction—slightly alkaline or moderately alkaline
Roots—many very fine and few fine
Pores—common fine
Clay content—18 to 34 percent
Thickness—5 to 18 inches

Ck horizon:
Color—hue of 2.5YR or 5YR, value of 5, and chroma of 4 to 6
Texture—clay loam or silty clay loam
Reaction—moderately alkaline
Roots—common very fine
Pores—common fine
Clay content—18 to 34 percent
Thickness—0 to 14

C1 horizon:
Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 3 to 8
Texture—silt loam with thin strata of coarser or finer textured material
Reaction—moderately alkaline
Roots—few very fine
Clay content—10 to 30 percent
Thickness—0 to 53 inches

C2 horizon:
Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 3 to 8
Texture—silty clay with thin strata of coarser or finer textured material
Reaction—moderately alkaline
Roots—few very fine
Clay content—10 to 30 percent
Thickness—0 to 53 inches

Ab horizon:
Color—hue of 5YR, value of 4, and chroma of 2 or 3
Texture—silty clay loam
Reaction—moderately alkaline
Roots—few very fine
Clay content—27 to 40 percent

Huska Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Deep
Drainage class: Moderately well drained
Parent material and geologic age: Material weathered from interbedded shale and sandstone of Permian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Summits and backslopes
Slope: 1 to 5 percent
Slope shape: Linear-convex
Elevation: 900 to 1,300 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine, mixed, superactive, thermic Mollic Natrustalfs

Associated Soils

These are the Chickasha, Grainola, Lucien, Renfrow, and Zaneis soils. Chickasha and Zaneis soils are on landscapes similar to those of the Huska soils. They have a fine-loamy control section and do not have a natric horizon. Grainola and Renfrow soils generally are on landscapes below the Huska soils. They do not have a natric horizon. Lucien soils are on landscapes similar to those of the Huska soils. They do not have a natric horizon and have a solum that is less than 20 inches thick.

Typical Pedon

Huska silt loam, on a slope of 1 percent, in an area of rangeland; Payne County, Oklahoma; on the Oklahoma State University Golf Driving Range in Stillwater; 2,200 feet west and 500 feet south of the northeast corner of sec. 10, T. 19 N., R. 2 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 9 inches; brown (7.5YR 5/4) silt loam, dark brown (7.5YR 3/4) moist; massive; hard, friable; slightly acid; abrupt smooth boundary. (4 to 9 inches thick)

Btn—9 to 18 inches; reddish brown (5YR 4/4) silty clay, dark reddish brown (5YR 3/4) moist; moderate coarse columnar structure; extremely hard, very firm; thick nearly continuous clay films on faces of peds; dark reddish brown (5YR 3/2) faces of peds; few fine black concretions; exchangeable sodium percentage of 22; neutral; clear smooth boundary. (7 to 11 inches thick)

Btnz1—18 to 25 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; few fine faint strong brown redoximorphic concentrations; moderate medium subangular blocky structure; extremely hard, very firm; thin nearly continuous clay films on faces of peds; exchangeable sodium percentage of 39; few fine calcium carbonate concretions; common fine visible threads of salts; moderately alkaline; clear smooth boundary. (8 to 18 inches thick)

Btnz2—25 to 34 inches; yellowish red (5YR 5/6) clay, yellowish red (5YR 4/6) moist; weak medium blocky structure; extremely hard, very firm; thin nearly continuous clay films on faces of peds; many fine irregular threads of salts; few medium crystals of gypsum; exchangeable sodium percentage of 53; moderately alkaline; clear smooth boundary. (9 to 23 inches thick)

B´tn—34 to 50 inches; red (2.5YR 5/6) clay, red (2.5YR 4/6) moist; weak fine subangular blocky structure; extremely hard, firm; thin patchy clay films on faces of peds; exchangeable sodium percentage of 52; moderately alkaline; abrupt smooth boundary. (10 to 33 inches thick)

Cr—50 to 55 inches; slightly gray (5YR 7/1) sandstone; rippable.

Range in Characteristics

Thickness of the solum: 40 to 60 inches

Depth to carbonates: More than 30 inches

Exchangeable sodium percentage: 15 to 55 percent in the Btn horizon

Electrical conductivity of saturation extract: 0 to 2 mmhos/cm in the A horizon and 2 to 6 mmhos/cm in the Btn horizon

Other features: The Ap horizon, or the material between the surface and a depth of 18 centimeters after mixing, has a moist color value of 3 or less and a dry color value of 5 or less (crushed and smoothed sample). The A horizon is typically hard when dry.

A horizon:

Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4

Texture—fine sandy loam, very fine sandy loam, loam, or silt loam

Reaction—moderately acid to neutral

Clay content—8 to 26 percent

Btn horizon:

Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 6

Texture—silty clay loam, clay loam, silty clay, or clay

Reaction—neutral to moderately alkaline

Clay content—35 to 45 percent

Redoximorphic features—red concentrations

Other features—a lower value and chroma on the faces of peds than in the matrix in most pedons

Btnz1 horizon:

Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 3 to 6

Texture—silty clay loam, clay loam, silty clay, or clay

Reaction—moderately alkaline

Clay content—35 to 60 percent

Redoximorphic features—red and brown concentrations

Other features—calcium carbonate concretions and visible threads of salts in most pedons

Btnz2 horizon:

Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8

Texture—silty clay loam, clay loam, clay, or silty clay

Reaction—moderately alkaline

Clay content—35 to 60 percent

Redoximorphic features—red and brown concentrations

Other features—soft bodies of calcium carbonate, threads of salts, and dark concretions in most pedons

B´tn horizon:

Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8

Texture—silty clay loam, clay loam, clay, or silty clay

Reaction—moderately alkaline

Clay content—35 to 60 percent

Other features—threads and soft bodies of salts in some pedons

Cr horizon:

Color—hue of 2.5YR to 7.5YR, value of 3 to 8, and chroma of 2 to 8

Kind of bedrock—weakly consolidated sandstone, sandy shale, and red siltstone with a low or moderate excavation difficulty

Reaction—slightly alkaline or moderately alkaline

Ironmound Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Shallow (fig. 7)
Drainage class: Well drained
Parent material and geologic age: Material weathered from sandstone or sandstone interbedded with siltstone or sandy shale; of Permian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Summits and backslopes
Slope: 1 to 40 percent
Slope shape: Convex-convex
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 38 inches
Mean annual air temperature: 58 to 63 degrees F
Frost-free days: 200 to 230 percent
Thornthwaite PE index: 44 to 64

Taxonomic class: Loamy, mixed, active, thermic, shallow Udic Haplustepts

Associated Soils

These are the Coyle, Grainola, Kingfisher, Masham, Piedmont, and Zaneis soils. Coyle, Grainola, Kingfisher, Piedmont, and Zaneis soils have a solum that is more than 20 inches thick and have a Bt horizon. Grainola, Masham, and Piedmont soils have a fine textured control section. Coyle and Kingfisher soils are on landscapes similar to those of the Ironmound soils. Grainola, Masham, and Piedmont soils are on the lower backslopes. Zaneis soils are on the higher ridge crests and the upper backslopes.

Typical Pedon

Ironmound loam, in an area of rangeland; Logan County, Oklahoma; 1 mile west and 2 miles north of Lovell; 500 feet west and 1,300 feet north of the southeast corner of sec. 30, T. 19 N., R. 4 W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 7 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure parting to moderate medium granular; hard, friable; many very fine and fine roots; common very fine and fine pores; slightly acid; clear smooth boundary. (4 to 8 inches thick)

Bw—7 to 16 inches; red (2.5YR 4/6) loam, dark red (2.5YR 3/6) moist; moderate medium subangular blocky structure; hard, friable; common very fine and fine roots; common very fine and fine pores; neutral; clear smooth boundary. (5 to 14 inches thick)

Cr—16 to 40 inches; red (2.5YR 4/6), weathered sandstone, dark red (2.5YR 3/6) moist; neutral.

Range in Characteristics

Thickness of the ochric epipedon: 4 to 8 inches
Thickness of the solum: 10 to 20 inches
Depth to bedrock: 10 to 20 inches

A horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 2 to 6
Texture—loam, silt loam, very fine sandy loam, or fine sandy loam
Reaction—moderately acid to moderately alkaline
Clay content—10 to 25 percent
Content of rock fragments, by volume—0 to 10 percent sandstone pebbles less than 76 millimeters in diameter

Bw horizon:
Color—hue of 10R to 5YR, value of 4 or 5, and chroma of 4 to 6
Texture—loam or fine sandy loam
Reaction—slightly acid to moderately alkaline
Clay content—10 to 27 percent
Content of rock fragments, by volume—0 to 10 percent sandstone pebbles less than 76 millimeters in diameter

Cr horizon:
Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 4 to 8
Kind of bedrock—weathered sandstone or shale or sandstone interbedded with siltstone or shale; high or very high excavation difficulty
Reaction—neutral to moderately alkaline

Keokuk Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Loamy and sandy alluvium of Recent age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Low flood plains
Slope: 0 to 1 percent
Slope shape: Linear-linear

Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Coarse-silty, mixed, superactive, thermic Fluventic Haplustolls

Associated Soils

These are the Amber, Asher, Dale, Gaddy, Lela, McLain, Port, and Yahola soils. Amber soils are on side slopes. They do not have a mollic epipedon. Whereas the Keokuk soils are in slightly convex areas, Asher, Dale, Lela, and McLain soils are in slightly concave areas. Lela and McLain soils have a fine textured control section. Dale soils have a mollic epipedon that is more than 20 inches thick and have a fine-silty control section. Gaddy, Port, and Yahola soils generally are on the lower flood plains and are closer to the stream channels than the Keokuk soils. Gaddy soils have a sandy control section. Port soils have a mollic epipedon that is more than 20 inches thick and have a fine-silty control section. Yahola soils have a coarse-loamy control section.

Typical Pedon

Keokuk silt loam, in a cultivated area; Pottawatomie County, Oklahoma; about 6 miles east and 6 miles north of Shawnee; 1,850 feet east and 200 feet south of the northwest corner of sec. 29, T. 11 N., R. 5 E. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 12 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 3/2) moist; moderate fine granular structure; hard, very friable; slightly acid; gradual smooth boundary. (7 to 18 inches thick)

Bw—12 to 24 inches; brown (7.5YR 5/2) silt loam, brown (7.5YR 4/2) moist; weak medium subangular blocky structure; slightly hard, very friable; slightly alkaline; gradual smooth boundary. (8 to 26 inches thick)

C—24 to 65 inches; light brown (7.5YR 6/4) very fine sandy loam, brown (7.5YR 5/4) moist; massive; slightly hard, very friable; stratified with a few layers of silt loam, loam, and loamy very fine sand that are 1/4 inch to 3 inches thick; few films of secondary carbonates at a depth of 29 inches; calcareous; moderately alkaline.

Range in Characteristics

Thickness of the solum: 18 to 44 inches
Depth to carbonates: 10 to 35 inches

Ap or A horizon:
Color—hue of 5YR or 10YR, value of 4 or 5, and chroma of 2 or 3
Texture—silt loam, loam, or very fine sandy loam
Reaction—slightly acid to moderately alkaline
Clay content—10 to 18 percent

Bw horizon:
Color—hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 2 to 8
Texture—silt loam, loam, or very fine sandy loam
Reaction—slightly acid to moderately alkaline
Clay content—10 to 18 percent

C horizon:
Color—hue of 2.5YR to 10YR, value of 4 to 7, and chroma of 2 to 8
Texture—stratified silt loam, loam, very fine sandy loam, or loamy very fine sand
Reaction—slightly alkaline or moderately alkaline
Clay content—5 to 18 percent

Kingfisher Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Moderately deep
Drainage class: Well drained
Parent material and geologic age: Loamy material weathered from silty red beds of Permian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Summits and backslopes
Slope: 0 to 8 percent
Slope shape: Linear-convex
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 38 inches
Mean annual air temperature: 58 to 63 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine-silty, mixed, active, thermic Udic Argiustolls

Associated Soils

These are the Bethany, Grainola, Grant, Ironmound, Lucien, Nash, Norge, Piedmont, Pond Creek, and Renthin soils. Bethany, Grant, and Nash soils are on nearby landscapes. Grainola soils are on landscapes similar to those of the Kingfisher soils. They do not have a mollic epipedon and have more

Figure 7.—A road cut in an area of Coyle-Ironmound complex, 3 to 5 percent slopes, eroded. The Ironmound soil is shallow over sandstone bedrock.

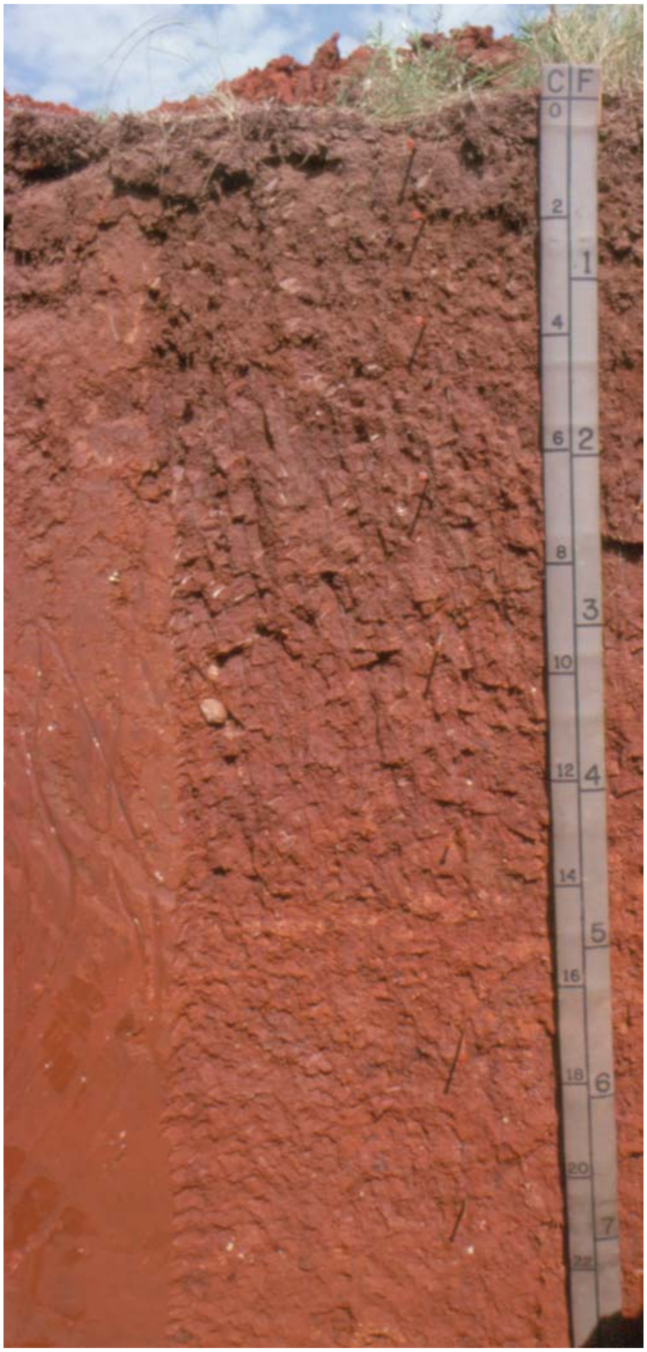

Figure 8.—Profile of Renfrow silt loam, 1 to 3 percent slopes. This soil is very deep. When multiplied by 10, the numbers on the left side of the scale indicate the depth in centimeters. The right side indicates the depth in feet.

Figure 9.—Profile of Zaneis loam, 1 to 3 percent slopes. This soil is deep. When multiplied by 10, the numbers on the left side of the scale indicate the depth in centimeters. The right side indicates the depth in feet.

than 35 percent clay in the textural control section. Ironmound, Lucien, Piedmont, and Renthin soils generally are in the more sloping areas. Ironmound and Lucien soils do not have a Bt horizon and are less than 20 inches deep over sandstone. In addition, Ironmound soils do not have a mollic epipedon. Nash soils do not have a Bt2 horizon and have less than 18 percent clay in the control section. Norge and Pond Creek soils are on the lower parts of high stream terraces. Piedmont and Renthin soils have more than 35 percent clay in the textural control section.

Typical Pedon

Kingfisher silt loam, in a cultivated area; Kingfisher County, Oklahoma; about 1 mile west and 5 miles south of Kingfisher; 1,800 feet west and 50 feet south of the northeast corner of sec. 16, T. 15 N., R. 7 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 14 inches; reddish brown (5YR 4/3) silt loam, dark reddish brown (5YR 3/3) moist; moderate medium granular structure; slightly hard, friable; many fine roots; the upper 6 inches mixed by cultivation; many fine pores; slightly acid; gradual smooth boundary. (8 to 16 inches thick)

BA—14 to 21 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; moderate coarse granular structure; hard, friable; many fine roots; neutral; gradual smooth boundary. (3 to 10 inches thick)

Bt1—21 to 32 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; hard, firm; common fine roots throughout peds; distinct continuous clay films on faces of peds; slightly alkaline; gradual smooth boundary. (6 to 16 inches thick)

Bt2—32 to 38 inches; reddish brown (2.5YR 4/4) silty clay loam, dark reddish brown (2.5YR 3/4) moist; moderate medium subangular blocky structure; hard, firm; few fine pores; few fine roots; distinct continuous clay films on faces of peds; moderately alkaline; gradual boundary. (2 to 10 inches thick)

Cr—38 to 46 inches; red (2.5YR 5/8), weathered silty shale red beds, red (2.5YR 4/8) moist; weakly effervescent.

Range in Characteristics

Thickness of the mollic epipedon: 8 to 16 inches
Thickness of the solum: 20 to 40 inches
Depth to bedrock: 20 to 40 inches

Ap horizon:
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3
Texture—loam or silt loam
Reaction—slightly acid to slightly alkaline
Clay content—15 to 27 percent

BA horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 2 to 4
Texture—silt loam, silty clay loam, or clay loam
Reaction—slightly acid or slightly alkaline
Clay content—25 to 35 percent

Bt1 horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6
Texture—silty clay loam or clay loam
Reaction—slightly acid to moderately alkaline
Clay content—27 to 35 percent

Bt2 horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6
Texture—silty clay loam, clay loam, or silty clay
Reaction—slightly acid to moderately alkaline
Clay content—27 to 40 percent

BC horizon (where present):
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6
Texture—silty clay loam, clay loam, or silty clay
Reaction—neutral to moderately alkaline
Clay content—27 to 40 percent

Cr horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8
Kind of bedrock—interbedded, weathered, paralithic siltstone, shale, and sandstone; high excavation difficulty
Reaction—slightly alkaline or moderately alkaline

Kirkland Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: A predominantly clayey mantle over shale of Permian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Terraces
Position: Treads
Slope: 0 to 3 percent
Slope shape: Linear-linear/concave

Elevation: 190 to 220 feet
Mean annual precipitation: 26 to 38 inches
Mean annual air temperature: 58 to 64 degrees F
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine, mixed, superactive, thermic Udertic Paleustolls

Associated Soils

These are the Aydelotte, Bethany, Doolin, Grainola, Pawhuska, Piedmont, Pond Creek, Renfrow, Renthin, Tabler, and Waurika soils. Aydelotte, Grainola, Piedmont, Renthin, and Renfrow soils are on side slopes on the lower parts of the landscape. Aydelotte and Grainola soils do not have a mollic epipedon. Piedmont and Renthin soils have a solum that is less than 60 inches thick. Bethany soils are on the slightly higher parts of the landscape. Doolin and Pawhuska soils are on nearby landscapes. They have a natric horizon. Pond Creek soils are on high terraces. They are fine-silty. Tabler soils are on the same landscape as the Kirkland soils but are in slightly lower positions. Waurika soils are in slightly concave areas on nearby landscapes.

Typical Pedon

Kirkland silt loam, in a cultivated area; Logan County, Oklahoma; about 4 miles south and 8 miles west of Guthrie; 1,000 feet north and 150 feet west of the southeast corner of sec. 36, T. 16 N., R. 4 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) (exterior, dry) and grayish brown (10YR 5/2) (crushed, dry) silt loam, very dark brown (10YR 2/2) exterior, moist, and very dark grayish brown (10YR 3/2) crushed, moist; moderate medium subangular blocky structure parting to moderate fine granular; soft, very friable; common very fine and fine roots throughout; common very fine and fine vesicular and tubular pores; electrical conductivity of less than 1 mmhos/cm in the saturation extract; SAR of less than 1; strongly acid; abrupt wavy boundary. (6 to 14 inches thick)

Bt1—8 to 19 inches; dark grayish brown (10YR 4/2) (exterior, dry) and dark grayish brown (10YR 4/2) (crushed, dry) silty clay, black (10YR 2/1) exterior, moist, and very dark gray (10YR 3/1) crushed, moist; weak medium prismatic structure parting to strong medium subangular blocky; very hard, very firm; common very fine and fine roots throughout; common very fine and fine vesicular and tubular pores; few fine rounded iron-manganese concretions; distinct discontinuous clay films in root channels and pores in 65 percent of the volume; electrical conductivity of less than 1 mmhos/cm in the saturation extract; SAR of 2; neutral; gradual smooth boundary. (11 to 15 inches thick)

Bt2—19 to 28 inches; brown (7.5YR 4/2) (exterior, dry) and brown (7.5YR 4/3) (crushed, dry) silty clay, dark brown (7.5YR 3/2) exterior, moist, and dark brown (7.5YR 3/3) crushed, moist; weak medium and coarse prismatic structure parting to strong medium subangular blocky; extremely hard, extremely firm; common very fine and fine roots throughout; common very fine and fine vesicular and tubular pores; about 2 percent, by volume, prominent continuous intersecting slickensides on faces of peds; slightly alkaline; electrical conductivity of less than 1 mmhos/cm in the saturation extract; SAR of 4; clear smooth boundary. (6 to 20 inches thick)

Btk—28 to 42 inches; brown (7.5YR 4/2) (exterior, dry) and brown (7.5YR 4/3) (crushed, dry) silty clay, dark brown (7.5YR 3/2) exterior, moist, and dark brown (7.5YR 3/3) crushed, moist; weak medium and coarse prismatic structure parting to strong medium angular blocky; extremely hard, extremely firm; common very fine and fine roots throughout; common very fine and fine vesicular and tubular pores; few fine and medium irregular carbonate threads; few medium rounded carbonate concretions; few medium rounded iron-manganese concretions; common distinct discontinuous clay films on faces of peds; common prominent continuous intersecting slickensides; strongly effervescent; moderately alkaline; electrical conductivity of 1 mmhos/cm in the saturation extract; SAR of 6; gradual wavy boundary. (10 to 20 inches thick)

2Bt1—42 to 51 inches; brown (7.5YR 4/4) (exterior, dry) and dark brown (7.5YR 3/4) (crushed, dry) silty clay, dark brown (7.5YR 3/4) exterior, moist, and dark brown (7.5YR 3/4) crushed, moist; strong medium prismatic structure parting to strong medium angular blocky; extremely hard, extremely firm; few very fine and fine roots throughout; common very fine and fine vesicular and tubular pores; few fine and medium rounded iron-manganese concretions; common faint continuous clay films on faces of peds; common distinct continuous intersecting slickensides; moderately alkaline; strongly effervescent; electrical conductivity of 1.5 mmhos/cm in the saturation extract; SAR of 7; gradual wavy boundary. (0 to 16 inches thick)

2Btk—51 to 60 inches; reddish brown (2.5YR 4/4) (exterior, dry) and reddish brown (2.5YR 4/4)

(crushed, dry) silty clay, dark reddish brown (2.5YR 3/4) exterior, moist, and dark reddish brown (2.5YR 3/4) crushed, moist; many fine and common medium distinct dark red (2.5YR 3/6) redoximorphic accumulations associated with root channels; moderate medium and coarse prismatic structure parting to strong medium angular blocky; very hard, very firm; common very fine and fine roots throughout; common very fine and fine vesicular and tubular pores; few fine and medium rounded and few coarse rounded iron-manganese concretions; few medium and coarse carbonate concretions; cracks between peds filled with dark brown (7.5YR 3/3) silty clay loam; moderately alkaline; strongly effervescent; 1 percent quartzite pebbles; electrical conductivity of 1.76 mmhos/cm in the saturation extract; SAR of 8; gradual wavy boundary. (0 to 18 inches thick)

2Bt2—60 to 75 inches; red (2.5YR 4/6) (exterior, dry) and reddish brown (2.5YR 4/4) (crushed, dry) silty clay, dark reddish brown (2.5YR 3/6) exterior, moist, and dark red (2.5YR 3/4) crushed, moist; common fine and medium prominent gray (10YR 6/1) and very dark gray (10YR 3/1) redoximorphic depletions associated with root channels; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; very hard, very firm; few very fine and fine roots throughout; common fine and common very fine vesicular and tubular pores; cracks between peds filled with dark gray (7.5YR 3/3) silty clay loam from above; slightly alkaline; strongly effervescent; electrical conductivity of 2.16 mmhos/cm in the saturation extract; SAR of 8; diffuse wavy boundary. (0 to 15 inches thick)

2Bt3—75 to 82 inches; red (2.5YR 4/6) (exterior, dry) and reddish brown (2.5YR 4/4) (crushed, dry) silty clay, dark red (2.5YR 3/6) exterior, moist, and dark reddish brown (2.5YR 3/4) crushed, moist; few medium prominent brown (7.5YR 5/3), common fine distinct reddish gray (5YR 5/2), and common fine prominent very dark grayish brown (10YR 3/2) redoximorphic accumulations and depletions associated with root channels; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; very hard, very firm; common very fine roots throughout; common fine and very fine vesicular and tubular pores; few fine irregular threads of calcium carbonate; slightly alkaline; strongly effervescent; electrical conductivity of 2.12 mmhos/cm in the saturation extract; SAR of 7; abrupt wavy boundary. (0 to 11 inches thick)

3Cr—82 to 98 inches; red (2.5YR 5/8) (exterior, dry), weakly cemented sandy siltstone, red (2.5YR 4/8) exterior, moist; very hard, very firm; very few very fine roots in cracks; very slightly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 17 to 25 inches
Thickness of the solum: More than 60 inches
Depth to carbonates: 25 to 50 inches
Depth to bedrock: More than 60 inches
Other features: Cracks within 125 centimeters of the surface that are 5 millimeters or more wide through a thickness of 30 centimeters or more for some time in most years; slickensides in a layer 15 centimeters or more thick that has its upper boundary within 125 centimeters of the surface; a linear extensibility of 6.0 centimeters or more between the mineral soil surface and a depth of 100 centimeters

A horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 or 3
Texture—silt loam, clay loam, or silty clay loam
Reaction—moderately acid to neutral
Clay content—13 to 35 percent
Electrical conductivity of the saturation extract—0 to 1 mmhos/cm
Sodium adsorption ratio—1 to 4

Bt1 horizon:
Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 or 3
Texture—clay or silty clay
Reaction—neutral or slightly alkaline
Clay content—40 to 60 percent
Electrical conductivity of the saturation extract—0 to 2 mmhos/cm
Sodium adsorption ratio—2 to 12

Bt2 horizon:
Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 4
Texture—clay or silty clay
Reaction—neutral to moderately alkaline
Clay content—40 to 60 percent
Electrical conductivity of the saturation extract—0 to 2 mmhos/cm
Sodium adsorption ratio—2 to 12

Btk horizon:
Color—hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 3 to 6
Texture—clay, silty clay, clay loam, or silty clay loam
Reaction—slightly alkaline or moderately alkaline and calcareous

Clay content—35 to 60 percent
Electrical conductivity of the saturation extract—2 to 4 mmhos/cm
Sodium adsorption ratio—3 to 16

2Bt horizon(s):
Color—hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 2 to 8
Texture—clay, silty clay, clay loam, or silty clay loam
Reaction—slightly alkaline or moderately alkaline and calcareous
Clay content—35 to 60 percent
Electrical conductivity of the saturation extract—2 to 4 mmhos/cm
Sodium adsorption ratio—3 to 16
Redoximorphic features—common redoximorphic accumulations and depletions in shades of red, brown, and gray

3Cr horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 8, and chroma of 2 to 8
Kind of bedrock—weakly consolidated shale, clay, or siltstone; low or moderate excavation difficulty
Reaction—moderately alkaline and calcareous

Konawa Series

Major land resource area: Northern Cross Timbers (84A)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Sandy and loamy stream terrace sediments of Pleistocene age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Terraces
Position: Treads and risers
Slope: 0 to 20 percent
Slope shape: Linear/convex-convex
Elevation: 500 to 1,500 feet
Mean annual precipitation: 30 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 48 to 64

Taxonomic class: Fine-loamy, mixed, active, thermic Ultic Haplustalfs

Associated Soils

These are the Bastrop, Dougherty, Eufaula, Stidham, and Teller soils. Bastrop soils have an argillic horizon that is thicker than that of the Konawa soils and that does not decrease in clay content. They are on broad flats and are slightly higher and farther from the stream channels than the Konawa soils. Dougherty and Stidham soils are in areas of the landscape similar to those of the Konawa soils or are in slightly higher areas. Eufaula soils have an A horizon that is more than 20 inches thick and have a sandy control section. They are on the slightly higher landscapes. Teller soils have a mollic epipedon. They generally are on landscapes similar to those of the Konawa soils but are farther from the stream channels.

Typical Pedon

Konawa fine sandy loam, in a bermudagrass pasture; Payne County, Oklahoma; about 8 miles west and 1 mile south of Perkins; 2,000 feet north and 200 feet west of the southeast corner of sec. 10, T. 17 N., R. 1 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 9 inches; brown (7.5YR 5/2) fine sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; slightly hard, very friable; slightly acid; clear smooth boundary. (4 to 10 inches thick)
E—9 to 17 inches; light reddish brown (5YR 6/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine granular structure; slightly hard, very friable; slightly acid; clear smooth boundary. (0 to 17 inches thick)
Bt—17 to 53 inches; red (2.5YR 4/6) sandy clay loam, dark red (2.5YR 3/6) moist; moderate medium subangular blocky structure; very hard, friable; thin discontinuous clay films on faces of peds; moderately acid; gradual smooth boundary. (10 to 36 inches thick)
BC—53 to 72 inches; red (2.5YR 5/6) fine sandy loam, red (5YR 4/6) moist; weak coarse subangular blocky structure; very hard, friable; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 20 inches
Thickness of the solum: 40 to 60 inches
Depth to carbonates: 10 to 30 inches

A horizon:
Color—hue of 5YR to 10YR, value of 4 to 7, and chroma of 2 to 6
Texture—fine sandy loam, loamy fine sand, or fine sand
Reaction—strongly acid to slightly acid
Clay content—2 to 18 percent

E horizon:
Color—hue of 5YR to 10YR, value of 5 to 8, and chroma of 2 to 6

Texture—fine sandy loam, loamy fine sand, or fine sand
Reaction—strongly acid to slightly acid
Clay content—2 to 18 percent

Bt horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 7, and chroma of 4 to 8
Texture—fine sandy loam or sandy clay loam
Reaction—strongly acid to neutral
Clay content—18 to 30 percent
Content of rock fragments, by volume—0 to 5 percent rounded pebbles 2 to 10 millimeters in diameter

BC horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 7, and chroma of 4 to 8
Texture—fine sandy loam, sandy clay loam, or loamy fine sand
Reaction—strongly acid to neutral
Clay content—7 to 30 percent

C horizon (where present):
Color—hue of 2.5YR to 7.5YR, value of 4 to 7, and chroma of 4 to 8
Texture—fine sandy loam, loamy fine sand, or fine sand
Reaction—strongly acid to slightly alkaline
Clay content—7 to 30 percent

Latrass Series

Major land resource area: Central Rolling Red Plains (78C), Central Rolling Red Prairies (80A), and Northern Cross Timbers (84A)
Depth class: Deep
Drainage class: Well drained
Parent material and geologic age: Reconstructed soils of Recent age
Landscape: Uplands
Landform: Hills
Distinctive surface features: Mounds
Slope: 1 to 45 percent
Slope shape: Convex-convex
Elevation: 800 to 1,600 feet
Mean annual precipitation: 14 to 56 inches
Mean annual air temperature: 54 to 63 degrees F
Frost-free days: 190 to 230
Thornthwaite PE index: 26 to 80

Taxonomic class: Fine, mixed, active, nonacid, thermic Haplic Ustarents

Associated Soils

These are the Coyle, Grainola, Ironmound, Kingfisher, Norge, Renfrow, Renthin, and Teller soils. Coyle and Kingfisher soils have a mollic epipedon and have a solum that is 20 to 40 inches thick. Grainola soils have a solum 20 to 40 inches thick. Ironmound soils have a loamy control section and have bedrock within 20 inches of the surface. Norge and Renfrow soils have a mollic epipedon and have a solum that is more than 60 inches thick. Renthin soils have a mollic epipedon and have a solum that is 40 to 60 inches thick. Teller soils have a mollic epipedon, have a fine-loamy control section, and have a solum that is more than 50 inches thick.

Typical Pedon

Latrass loam, 1 to 45 percent slopes, constructed; Oklahoma County, Oklahoma; about 1 mile south and 1 mile east of Valley Brook, Oklahoma; 825 feet north and 350 feet west of the southeast corner of sec. 25, T. 11 N., R. 3 W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 8 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/4) moist; massive; hard, friable; slightly alkaline; clear smooth boundary. (6 to 16 inches thick)
C1—8 to 22 inches; red (2.5YR 4/6) clay loam, dark red (2.5YR 3/6) moist; massive; extremely hard, very firm; moderately alkaline; gradual smooth boundary. (14 to 39 inches thick)
C2—22 to 42 inches; red (2.5YR 5/6) clay, red (2.5YR 4/6) moist; massive; extremely hard, extremely firm; moderately alkaline; clear smooth boundary.

Range in Characteristics

Thickness of the solum: 0 to 16 inches
Depth to bedrock: More than 60 inches

A horizon:
Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4
Texture—loam, clay loam, or silty clay loam
Reaction—slightly alkaline to moderately alkaline

C horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 3 to 6
Texture—clay loam, silty clay loam, or clay
Reaction—moderately alkaline
Clay content—35 to 60 percent

Lawrie Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep

Drainage class: Well drained
Parent material and geologic age: Loamy alluvium of Recent age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: High flood plains or low flood plains
Slope: 0 to 3 percent
Slope shape: Linear-linear
Elevation: 700 to 1,400 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine-silty, mixed, superactive, thermic Pachic Argiustolls

Associated Soils

These are the Ashport, Easpur, Norge, Port, Pulaski, Teller, and Yahola soils. Ashport, Easpur, Port, Pulaski, and Yahola soils are on the lower parts of flood plains and are closer to streams than the Lawrie soils. Easpur soils have a fine-loamy control section, and Pulaski and Yahola soils have a coarse-loamy control section. Norge and Teller soils are on stream terraces and are farther from streams than the Lawrie soils. Teller soils have a fine-loamy control section.

Typical Pedon

Lawrie silt loam, in a cultivated area; Logan County, Oklahoma; 1,800 feet east and 700 feet south of the northwest corner of sec 27, T. 17 N., R. 1 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 6 inches; reddish brown (5YR 4/3) (crushed, dry) loam, dark reddish brown (5YR 3/3) crushed, moist; moderate fine subangular blocky structure parting to moderate medium granular; soft, very friable; many very fine and fine roots throughout; common very fine and fine discontinuous tubular pores; moderately acid (pH 5.8); abrupt smooth boundary. (6 to 25 inches thick)

Ad—6 to 10 inches; reddish brown (5YR 4/3) (crushed, dry) loam, dark reddish brown (5YR 3/2) crushed, moist; moderate coarse subangular blocky structure; very hard, very firm; many very fine and fine roots between peds; few very fine discontinuous tubular pores; slightly acid (pH 5.8); abrupt smooth boundary. (0 to 4 inches thick)

Bt1—10 to 19 inches; reddish brown (5YR 4/3) (crushed, dry) silt loam, dark reddish brown (5YR 3/3) crushed, moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; hard, friable; common very fine and fine roots throughout; many very fine and many fine continuous tubular pores; common faint discontinuous clay films on faces of peds; slightly acid (pH 6.0); gradual smooth boundary. (0 to 7 inches thick)

Bt2—19 to 26 inches; reddish brown (5YR 4/3) (crushed, dry) silty clay loam, dark reddish brown (5YR 3/3) crushed, moist; moderate medium prismatic structure parting to strong medium angular blocky; hard, very firm; common very fine roots throughout; many very fine and many fine continuous tubular pores; many distinct continuous clay films on faces of peds; slightly acid (pH 6.3); gradual wavy boundary. (7 to 26 inches thick)

2Btb1—26 to 34 inches; dark reddish brown (5YR 4/3) (crushed, dry) clay loam, dark reddish brown (5YR 3/3) crushed, moist; strong medium prismatic structure parting to strong medium angular blocky; very hard, very firm; common very fine roots throughout; common fine and many very fine continuous tubular pores; many distinct continuous clay films on vertical and horizontal faces of peds; slightly acid (pH 6.3); gradual wavy boundary. (7 to 22 inches thick)

2Btb2—34 to 51 inches; red (2.5YR 4/6) (crushed, dry) loam, red (2.5YR 3/6) crushed, moist; strong medium prismatic structure parting to strong medium angular blocky; very hard, very firm; few very fine roots throughout; common fine and many very fine continuous tubular pores; many distinct continuous clay films on vertical and horizontal faces of peds; slightly acid (pH 6.5); diffuse wavy boundary. (0 to 23 inches thick)

2Btb3—51 to 72 inches; red (2.5YR 5/6) (crushed, dry) loam, red (2.5YR 4/6) crushed, moist; strong coarse prismatic structure parting to strong coarse angular blocky; very hard, firm; few very fine roots throughout; many very fine, common fine, and few medium continuous tubular pores; few faint continuous clay films on vertical and horizontal faces of peds; common fine irregular masses of iron and manganese; neutral (pH 7.0); abrupt wavy boundary. (0 to 14 inches thick)

2Bkb—72 to 82 inches; red (2.5YR 5/6) (crushed, dry) loam, red (2.5YR 4/6) crushed, moist; moderate medium prismatic structure parting to moderate medium angular blocky; hard, firm; few very fine roots throughout; many very fine, many fine, and common medium continuous tubular pores; secondary calcium carbonates occurring as long and narrow, vertically oriented bodies of soft lime; many very coarse and extremely coarse cylindrical masses of lime; strongly effervescent;

moderately alkaline (pH 8.0); gradual wavy boundary. (0 to 23 inches thick)

2BCkb—82 to 89 inches; red (2.5YR 5/6) (crushed, dry) sandy clay loam, red (2.5YR 4/6) moist; weak medium prismatic structure; hard, friable; few very fine roots between peds; many very fine, many fine, and common medium continuous tubular pores; common fine irregular masses of iron and manganese; many very coarse and extremely coarse cylindrical soft masses of lime and few fine and medium dendritic lime nodules; strongly effervescent; moderately alkaline (pH 8.0). (0 to 22 inches thick)

Range in Characteristics

Thickness of the mollic epipedon: 20 to 55 inches
Thickness of the solum: More than 60 inches
Depth to carbonates: 30 to 60 inches

A horizon:
Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 or 3
Texture—silt loam or loam
Reaction—mainly slightly acid or neutral, but ranging to very strongly acid where nitrogen fertilizer has been applied extensively
Clay content—15 to 26 percent

BA horizon (where present):
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3
Texture—silt loam or silty clay loam
Reaction—slightly acid to moderately alkaline
Clay content—15 to 35 percent

Bt and Btb1 horizons:
Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4
Texture—silty clay loam, silt loam, or loam
Reaction—slightly acid to moderately alkaline
Clay content—18 to 35 percent

2Btb horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 2 to 6
Texture—silty clay loam, clay loam, or loam
Reaction—slightly acid to moderately alkaline
Clay content—18 to 35 percent

Bk or 2Bkb horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 or 6
Texture—silty clay loam or clay loam
Reaction—moderately alkaline and calcareous
Calcium carbonate—occurring as masses or concretions
Clay content—29 to 38 percent

BC, BCk, or 2BCkb horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 or 6
Texture—silty clay loam or clay loam
Reaction—moderately alkaline

Littleaxe Series

Major land resource area: Northern Cross Timbers (84A)
Depth class: Deep
Drainage class: Well drained
Parent material and geologic age: Material weathered from weakly cemented sandstone interbedded with weakly cemented shale; of Permian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Summits and backslopes
Slope: 1 to 5 percent
Slope shape: Linear-convex
Elevation: 900 to 1,300 feet
Mean annual precipitation: 30 to 38 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 48 to 64

Taxonomic class: Fine-loamy, siliceous, active, thermic Ultic Haplustalfs

Associated Soils

These are the Darnell, Darsil, Harrah, Newalla, Noble, and Stephenville soils. Darnell and Darsil soils do not have a Bt horizon and are less than 20 inches deep over bedrock. They generally are on landscapes similar to those of the Littleaxe soils. Harrah soils have solum that is more than 60 inches thick and do not decrease in clay content by 20 percent or more within 60 inches of the surface. They are on foot slopes. Newalla soils have an abrupt texture change between the A and Bt horizons and have a fine textured control section. They are on landscapes similar to those of the Littleaxe soils. Noble soils have a coarse-loamy control section. They are on foot slopes. Stephenville soils have a solum that is 20 to 40 inches thick. They are on landscapes similar to those of the Littleaxe soils.

Typical Pedon

Littleaxe loamy fine sand, on a convex, southeast-facing slope of 2 percent, on an upland ridge crest under post oak and blackjack forest; Cleveland County,

Oklahoma; about 11 miles east of the intersection of Oklahoma State Highway 9 and U.S. Highway 77; 2,120 feet west and 380 feet south of the northeast corner of sec. 6, T. 8 N., R. 1 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 7 inches; grayish brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable; many very fine and fine roots; neutral; clear wavy boundary. (3 to 10 inches thick)

E—7 to 16 inches; pink (7.5YR 7/4) loamy fine sand, brown (7.5YR 5/4) moist; weak fine granular structure; soft, very friable; many very fine and fine roots; slightly acid; clear wavy boundary. (0 to 11 inches thick)

Bt1—16 to 28 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; very hard, friable; common very fine, fine, and medium roots; nearly continuous clay films on faces of peds; strongly acid; gradual smooth boundary. (7 to 21 inches thick)

Bt2—28 to 37 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; very hard, friable; common very fine, fine, and medium roots; patchy clay films on faces of peds; strongly acid; gradual smooth boundary. (0 to 24 inches thick)

BC1—37 to 43 inches; reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 5/6) moist; weak medium subangular blocky structure; hard, friable; common very fine, fine, and medium roots; patchy clay films on faces of peds; strongly acid; clear smooth boundary. (0 to 18 inches thick)

BC2—43 to 52 inches; 70 percent reddish yellow (7.5YR 7/6) fine sandy loam, reddish yellow (7.5YR 6.6) moist, and 30 percent yellowish red (7.5YR 6/8), redoximorphic concentrations, strong brown (7.5YR 5/8) moist; weak coarse subangular blocky structure; hard, friable; few very fine and fine roots; clay bridging sand grains; strongly acid; clear smooth boundary. (0 to 11 inches thick)

Cr—52 to 60 inches; reddish yellow (7.5YR 6/8) and yellowish red (5YR 5/6), weakly cemented sandstone interbedded with red (2.5YR 5/8), weakly cemented shale; strongly acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Depth to bedrock: 40 to 60 inches

A or Ap horizon:
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 4
Texture—loamy fine sand or fine sandy loam
Reaction—strongly acid to neutral
Clay content—3 to 13 percent

E horizon:
Color—hue of 5YR or 7.5YR, value of 4 to 7, and chroma of 3 to 6
Texture—loamy fine sand or fine sandy loam
Reaction—strongly acid to slightly acid
Clay content—3 to 13 percent

Bt1 horizon:
Color—hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 or 6
Texture—sandy clay loam
Reaction—very strongly acid to slightly acid
Clay content—29 to 35 percent
Redoximorphic features—red concentrations

Bt2 horizon:
Color—hue of 2.5YR to 7.5YR, value of 5 or 6, and chroma of 6 to 8
Texture—fine sandy loam or sandy clay loam
Reaction—very strongly acid to slightly acid
Clay content—18 to 35 percent

BC horizon:
Color—hue of 2.5YR to 7.5YR, value of 5 to 7, and chroma of 6 to 8
Texture—fine sandy loam or sandy clay loam
Reaction—very strongly acid to slightly acid in the upper part and strongly acid to neutral in the lower part
Clay content—14 to 30 percent
Redoximorphic features—red, yellow, and brown concentrations
Content of rock fragments, by volume—0 to 20 percent fragments 2 to 76 millimeters in diameter

Cr horizon:
Color—red, yellow, or brown
Kind of bedrock—weathered sandstone

Lomill Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Somewhat poorly drained
Parent material and geologic age: Clayey and loamy alluvium of Pleistocene age
Landscape: Valleys
Landform: Low flood plains
Slope: 0 to 1 percent
Slope shape: Linear-linear

Elevation: 800 to 1,300 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Clayey over loamy, mixed, superactive, thermic Udertic Haplustolls

Associated Soils

These are the Asher, Brewless, Keokuk, Port, and Weswood soils. Asher, Brewless, and Keokuk soils are rarely flooded and are on the higher flood plains. Asher soils have a fine-silty control section. Brewless soils have an argillic horizon and a fine textured control section. Keokuk soils have a coarse-silty control section. Port and Weswood soils are on the lower flood plains that drain the smaller tributaries. They have a fine-silty control section. Also, Weswood soils have an ochric epipedon.

Typical Pedon

Lomill silty clay, on a concave slope of 0.5 percent, in an improved bermudagrass pasture; Cleveland County, Oklahoma; about 5 miles west and 1 mile north of Norman; about 275 feet east and 200 feet north of the southwest corner of sec. 21, T. 9 N., R. 3 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 9 inches; brown (7.5YR 5/2) silty clay, dark brown (7.5YR 3/2) moist; moderate medium granular structure; hard, firm; many very fine and few fine roots; slightly effervescent; moderately alkaline; clear smooth boundary. (4 to 10 inches thick)

A—9 to 13 inches; brown (7.5YR 4/2) silty clay, dark brown (7.5YR 3/2) moist; moderate fine subangular blocky structure; very hard, very firm; common very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary. (0 to 8 inches thick)

Bw—13 to 27 inches; dark reddish gray (5YR 4/2) silty clay, dark reddish brown (5YR 3/2) moist; weak medium blocky structure; extremely hard, extremely firm; common very fine roots; common pressure faces; strongly effervescent; moderately alkaline; clear smooth boundary. (6 to 26 inches thick)

C—27 to 34 inches; brown (7.5YR 5/2) silty clay, dark brown (7.5YR 4/2) moist; massive; very hard, very firm; faint stratification; common very fine roots; few threads of calcium carbonate; violently effervescent; moderately alkaline; clear smooth boundary. (0 to 14 inches thick)

2C—34 to 60 inches; stratified brown (7.5YR 5/3) loam, light brown (7.5YR 6/4) very fine sandy loam, and reddish brown (5YR 4/3) silty clay, dark brown (7.5YR 4/3), brown (7.5YR 5/4), and reddish brown (5YR 4/3) moist; common medium distinct dark grayish brown (10YR 4/2) redoximorphic features below a depth of 50 inches; massive; hard, friable; few very fine roots; few soft bodies and threads of calcium carbonate; violently effervescent; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 27 inches
Thickness of the solum: 25 to 38 inches

Ap and A horizons:
Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 1 to 3
Texture—silty clay loam or silty clay
Reaction—slightly alkaline or moderately alkaline
Roots—few fine or common very fine
Clay content—27 to 55 percent

Bw horizon:
Color—hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 2 to 6
Texture—silty clay
Reaction—moderately alkaline
Roots—common very fine
Clay content—40 to 60 percent

C horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 2 to 6
Texture—silty clay loam or silty clay
Reaction—moderately alkaline
Roots—common very fine
Clay content—35 to 60 percent

2C horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 7, and chroma of 2 to 8
Texture—loamy very fine sand to silty clay loam
Reaction—moderately alkaline and calcareous
Clay content—5 to 45 percent
Redoximorphic features—brown, red, or gray

Miller Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Moderately well drained
Parent material and geologic age: Clayey alluvium of Pleistocene age
Physiographic region: Interior Lowlands

Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Low flood plains
Slope: 0 to 1 percent
Slope shape: Linear-linear, linear-concave
Elevation: 800 to 1,300 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine, mixed, superactive, thermic Udertic Haplustolls

Associated Soils

These are the Ashport, Gaddy, Port, Pulaski, and Yahola soils. Ashport and Port soils have less than 35 percent clay in the textural control section. Gaddy, Pulaski, and Yahola soils do not have a mollic epipedon and have less than 18 percent clay in the textural control section.

Typical Pedon

Miller clay, in a cultivated area; Cotton County, Oklahoma; about 4 miles west of Cookietown; 400 feet north and 500 feet east of the southwest corner of sec. 24, T. 3 S., R. 13 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 7 inches; reddish brown (5YR 5/3) clay, dark reddish brown (5YR 3/3) moist; weak medium granular structure; slightly hard, friable; many fine roots; few fine and medium pores; calcareous; moderately alkaline; clear smooth boundary. (0 to 9 inches thick)

A—7 to 14 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; moderate fine blocky structure; hard, firm; common fine roots; few fine and medium pores; calcareous; moderately alkaline; clear smooth boundary. (5 to 22 inches thick)

Bw—14 to 35 inches; reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; moderate medium blocky structure; very hard, very firm; few fine roots; few fine pores; shiny pressure faces on peds; few medium slickensides that do not intersect; common vertical cracks filled with material from above; few fine soft masses and concretions of calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary. (10 to 40 inches thick)

Ab—35 to 60 inches; dark reddish gray (5YR 4/2) clay, dark reddish brown (5YR 3/2) moist; moderate medium blocky structure; very hard, very firm; few fine roots; few fine pores; shiny faces on some peds; few fine slickensides that do not intersect; few fine soft masses and concretions of calcium carbonate; calcareous; moderately alkaline.

Range in Characteristics

Thickness of the solum: 30 to more than 60 inches
Depth to carbonates: Soft, powdery lime within 30 inches of the surface. (The soils are calcareous throughout the 10- to 40-inch control section.)
Other features: Cracks more than 1 centimeter wide extending from the surface to a depth of about 30 inches during some season in most years

A horizon:
Color—hue of 5YR or 7.5YR, value of 2 to 5, and chroma of 2 or 3
Texture—clay, silty clay, clay loam, or silty clay loam
Reaction—slightly alkaline or moderately alkaline
Clay content—35 to 50 percent

Bw horizon:
Color—hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 2 to 6
Texture—clay, silty clay, clay loam, or silty clay loam
Reaction—slightly alkaline or moderately alkaline
Clay content—35 to 60 percent

Ab horizon:
Color—hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 2 to 6
Texture—silt loam to clay
Reaction—slightly alkaline or moderately alkaline
Clay content—25 to 50 percent

C horizon (where present):
Color—hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 2 to 6
Texture—clay, silty clay, clay loam, silty clay loam, or silt loam
Reaction—slightly alkaline or moderately alkaline
Clay content—35 to 60 percent

Newalla Series

Major land resource area: Northern Cross Timbers (84A)
Depth class: Deep
Drainage class: Moderately well drained
Parent material and geologic age: Material weathered from shale of Permian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland

Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Backslopes
Slope: 1 to 25 percent
Slope shape: Convex-convex, linear-convex
Elevation: 800 to 1,200 feet
Mean annual precipitation: 30 to 38 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine-loamy over clayey, siliceous, superactive, thermic Udic Haplustalfs

Associated Soils

These are the Darnell, Darsil, Grainola, Harrah, Littleaxe, Renfrow, and Stephenville soils. Darnell and Darsil soils do not have an argillic horizon and are less than 20 inches deep over sandstone. They are mainly on ridge crests. Grainola soils are on side slopes of prairie uplands. Harrah, Littleaxe, and Stephenville soils have a fine-loamy control section. Also, Harrah soils have a solum that is more than 72 inches thick, and Stephenville soils have a solum that is 20 to 40 inches deep over sandstone. Harrah soils are on the lower foot slopes and side slopes, Littleaxe soils are on ridge crests, and Stephenville soils are on landscapes similar to those of the Newalla soils. Renfrow soils have a solum that is more than 60 inches thick. They are on the higher prairie uplands.

Typical Pedon

Newalla fine sandy loam, on a slightly convex, southeast-facing upland slope of 7 percent, under post oak and blackjack oak savannah; Cleveland County, Oklahoma; about 1 mile south and 7.4 miles east of Slaughterville; 1,900 feet east and 150 feet south of the northwest corner of sec. 21, T. 7 N., R. 1 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 3 inches; brown (7.5YR 4/2) fine sandy loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; slightly hard, very friable; many very fine and fine and common medium roots; strongly acid; clear smooth boundary. (2 to 9 inches thick)

E—3 to 6 inches; light brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; weak medium granular structure; slightly hard, very friable; many very fine and fine and common medium roots; very strongly acid; abrupt wavy boundary. (0 to 7 inches thick)

Bt1—6 to 10 inches; red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; moderate medium subangular blocky structure; hard, firm; common very fine, fine, and medium and few coarse roots; patchy clay films on faces of peds; many faces of peds coated with light brown (7.5YR 6/4) fine sandy loam; very strongly acid; clear wavy boundary. (3 to 15 inches thick)

2Bt2—10 to 16 inches; red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; moderate fine and medium blocky structure; very hard, very firm; common very fine and fine and few medium and coarse roots; nearly continuous clay films on faces of peds; very strongly acid; gradual wavy boundary. (4 to 23 inches thick)

2Btss—16 to 30 inches; red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; weak medium subangular blocky structure; extremely hard, extremely firm; common very fine and fine and few medium and coarse roots; few nonintersecting slickensides; nearly continuous clay films on faces of peds; few fine dark concretions; moderately acid; gradual wavy boundary. (0 to 26 inches thick)

2Btkss—30 to 42 inches; red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; weak medium subangular blocky and blocky structure; extremely hard, extremely firm; few very fine, fine, medium, and coarse roots; few nonintersecting slickensides; nearly continuous clay films on faces of peds; few fine dark concretions; common fine and medium soft masses of calcium carbonate; slight effervescence; slightly alkaline; gradual wavy boundary. (0 to 28 inches thick)

2B´tss—42 to 51 inches; red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; weak medium and coarse blocky structure; extremely hard, extremely firm; few very fine and fine roots; common nonintersecting slickensides; nearly continuous clay films on faces of peds; few fine dark concretions; slight effervescence; moderately alkaline; gradual wavy boundary.

2BC—51 to 58 inches; red (2.5YR 4/6) gravelly silty clay, dark red (2.5YR 3/6) moist; common fine distinct yellowish red (5YR 4/6) redoximorphic features; weak medium subangular blocky structure; very hard, very firm; few very fine roots; patchy clay films on faces of peds; 25 percent, by volume, shale fragments from 2 to 76 millimeters in diameter; slight effervescence; slightly alkaline; clear wavy boundary. (0 to 18 inches thick)

2Cr—58 to 80 inches; red (2.5YR 4/6), weakly laminated, soft shale; slightly alkaline.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Depth to bedrock: 40 to 60 inches

A or Ap horizon:
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 6
Texture—mainly fine sandy loam; also, loam or sandy clay loam in some eroded pedons
Reaction—strongly acid to neutral
Clay content—7 to 25 percent

E horizon:
Color—hue of 5YR to 10YR, value of 4 to 7, and chroma of 3 to 6
Texture—fine sandy loam
Reaction—very strongly acid to neutral
Clay content—7 to 17 percent

Bt1 horizon:
Color—hue of 2.5YR or 5YR, value of 5 or 6, and chroma of 3 to 8
Texture—sandy clay loam or clay loam
Reaction—very strongly acid to neutral
Clay content—20 to 35 percent

2Bt horizon:
Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 4 to 8
Texture—silty clay or clay
Reaction—very strongly acid to moderately alkaline
Clay content—40 to 60 percent
Redoximorphic features—red, yellow, or brown concentrations in some pedons

2Btk horizon:
Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 4 to 8
Texture—clay or silty clay
Reaction—neutral to moderately alkaline
Clay content—40 to 60 percent
Redoximorphic features—red, yellow, or brown concentrations in some pedons

2BC or 2BCk horizon:
Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 4 to 8
Texture—sandy clay, silty clay, gravelly silty clay, or very gravelly silty clay
Reaction—slightly alkaline or moderately alkaline
Clay content—40 to 60 percent
Redoximorphic features—red, yellow, or brown concentrations in some pedons
Other features—0 to 10 percent, by volume, soft accumulations of calcium carbonate

2Cr horizon:
Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 2 to 6
Reaction—slightly alkaline or moderately alkaline

Norge Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Loamy alluvium of Pleistocene age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Terraces
Position: Treads and risers
Slope: 0 to 8 percent
Slope shape: Linear-linear/convex
Elevation: 900 to 1,300 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine-silty, mixed, active, thermic Udic Paleustolls

Associated Soils

These are the Bethany, Grant, Navina, Pond Creek, Teller, and Vanoss soils. Bethany soils are on the same landscape as the Norge soils or are on higher landscapes. They have a fine textured control section. Grant soils are on side slopes. They have a solum that is less than 60 inches thick. Grant, Navina, Teller, and Vanoss soils decrease in clay content by more than 20 percent within a depth of 60 inches. Navina, Pond Creek, Teller, and Vanoss soils are on the lower terraces or are on the same terraces as the Norge soils but are closer to the streams. Pond Creek soils have a mollic epipedon that is more than 20 inches thick and decrease in clay content within a depth of 60 inches.

Typical Pedon

Norge silt loam, in a cultivated area; Pawnee County, Oklahoma; about 8 miles northeast of Pawnee; 725 feet east and 150 feet south of the northwest corner of sec. 9, T. 22 N., R. 6 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 12 inches; dark brown (7.5YR 4/2) silt loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; slightly hard, friable; many fine roots; moderately acid; gradual smooth boundary. (6 to 16 inches thick)

BA—12 to 18 inches; reddish brown (5YR 4/3) silty clay loam, dark reddish brown (5YR 3/3) moist;

moderate medium granular structure; hard, friable; many fine roots; moderately acid; gradual smooth boundary. (0 to 10 inches thick)

Bt1—18 to 36 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; moderate fine subangular blocky structure; very hard, firm; common fine roots; nearly continuous clay films on faces of peds; moderately acid; gradual smooth boundary. (9 to 25 inches thick)

Bt2—36 to 48 inches; red (2.5YR 5/6) silty clay loam, red (2.5YR 4/6) moist; moderate medium subangular blocky structure; very hard, firm; common fine roots; continuous clay films on faces of peds; slightly acid; gradual smooth boundary. (9 to 37 inches thick)

Bt3—48 to 66 inches; red (2.5YR 5/8) silty clay loam, red (2.5YR 4/8) moist; weak coarse subangular blocky structure; hard, firm; few fine roots; discontinuous clay films on faces of peds; slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 20 inches
Thickness of the solum: More than 60 inches
Depth to carbonates: More than 40 inches

A horizon:
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3
Texture—silt loam, loam, silty clay loam, or clay loam
Reaction—moderately acid to neutral
Clay content—15 to 35 percent

BA horizon:
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 4
Texture—silt loam, loam, silty clay loam, or clay loam
Reaction—moderately acid to neutral
Clay content—18 to 35 percent

Bt1 horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 6
Texture—silty clay loam or clay loam
Reaction—moderately acid to slightly alkaline
Clay content—27 to 35 percent

Bt2 horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 6
Texture—silty clay loam or clay loam
Reaction—moderately acid to slightly alkaline
Clay content—27 to 35 percent

Bt3 horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8
Redoximorphic features—concentrations and depletions in shades of gray, yellow, or brown in some pedons
Texture—silty clay loam, silty clay, or clay loam
Reaction—slightly acid to moderately alkaline
Clay content—27 to 50 percent

Piedmont Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Moderately deep
Drainage class: Well drained
Parent material and geologic age: Material weathered from clayey and silty shale of Permian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Shoulders and backslopes
Slope shape: Linear-convex or linear-linear
Slope: 1 to 5 percent
Elevation: 800 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine, mixed, superactive, thermic Udertic Argiustolls

Associated Soils

These are the Bethany, Grainola, Grant, Huska, Kingfisher, Kirkland, Lucien, Norge, Renfrow, Renthin, and Zaneis soils. Bethany, Kirkland, and Renfrow soils are in the higher positions, and Norge soils are in the lower positions. Bethany, Kirkland, Norge, and Renfrow soils have a solum that is more than 60 inches thick and have an argillic horizon that does not decrease in clay content from the maximum by more than 20 percent within a depth of 60 inches. Also, Bethany and Kirkland soils have a mollic epipedon that is more than 20 inches thick, and Norge soils have a fine-silty control section. Grainola soils are in the lower positions. They do not have a mollic epipedon and are calcareous. Grant, Huska, Kingfisher, and Lucien soils are on landscapes similar to those of the Piedmont soils. Grant and Kingfisher soils have a fine-silty control section. Grant soils have a solum that is 40 to

60 inches thick. Huska soils do not have a mollic epipedon and have a natric horizon. Lucien soils have a solum that is 10 to 20 inches thick and have a loamy control section. Renthin soils are on landscapes similar to those of the Piedmont soils but are at higher elevations. They are 40 to 60 inches deep. Zaneis soils are in the higher positions. They have a fine-loamy control section, have a solum that is 40 to 60 inches thick, and do not have secondary calcium carbonate accumulations.

Typical Pedon

Piedmont silt loam, in an area of native range; Oklahoma County, Oklahoma; about 9 miles west and 3 miles north of Edmond, Oklahoma; about 1,700 feet east and 100 feet north of the southwest corner of sec. 8, T. 14 N., R. 4 W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 6 inches; brown (7.5YR 4/2) silt loam, dark brown (7.5YR 3/2) moist; moderate very fine granular structure; hard, friable; many very fine and few fine roots; clear smooth boundary. (3 to 9 inches thick)

BA—6 to 8 inches; reddish brown (5YR 4/3) silty clay loam, dark reddish brown (5YR 3/3) moist; weak fine subangular blocky structure parting to moderate fine granular; very hard, firm; many very fine and few fine roots; patchy clay films on faces of peds; neutral; clear smooth boundary. (0 to 4 inches thick)

Btss—8 to 22 inches; reddish brown (2.5YR 4/4) silty clay, dark reddish brown (2.5YR 3/4) moist; weak medium prismatic structure parting to moderate fine blocky; extremely hard, extremely firm; many very fine roots; common nonintersecting slickensides; nearly continuous clay films on faces of peds; slightly alkaline; gradual smooth boundary. (5 to 17 inches thick)

Btkss—22 to 28 inches; reddish brown (2.5YR 5/4) silty clay, reddish brown (2.5YR 4/4) moist; weak medium prismatic structure parting to moderate medium blocky; extremely hard, extremely firm; common very fine roots; common nonintersecting slickensides; nearly continuous clay films on faces of peds; common masses of calcium carbonate; slightly effervescent; moderately alkaline; gradual smooth boundary. (0 to 17 inches thick)

Btk—28 to 36 inches; red (2.5YR 4/6) silty clay, dark red (2.5YR 3/6) moist; weak medium subangular blocky structure; very hard, extremely firm; common very fine roots; patchy clay films on faces of peds; common masses of calcium carbonate; strongly effervescent; moderately alkaline; clear wavy boundary. (0 to 14 inches thick)

Cr—36 to 48 inches; red (2.5YR 5/6 and 4/6), clayey and silty shale, red (2.5YR 4/6) and dark red (2.5YR 3/6) moist; soft; laminated; calcareous; moderately alkaline.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Depth to carbonates: 10 to 30 inches
Other features: Cracks within 125 centimeters of the mineral soil surface that are 5 millimeters or more wide through a thickness of 30 centimeters or more for some time in most years; slickensides or wedge-shaped aggregates in a layer 15 centimeters or more thick that has its upper boundary within 125 centimeters of the mineral soil surface; a linear extensibility of 6.0 centimeters or more between the mineral soil surface and either a depth of 100 centimeters or a paralithic contact

A or Ap horizon:
Color—hue of 2.5YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3
Texture—silty loam, silty clay loam, or clay loam
Reaction—slightly acid or neutral
Clay content—18 to 27 percent

BA horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 2 to 4
Texture—silty clay loam or clay loam
Reaction—slightly acid to slightly alkaline
Clay content—32 to 40 percent

Btss horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6
Texture—silty clay loam, silty clay, or clay
Reaction—neutral to moderately alkaline
Clay content—35 to 55 percent

Btkss horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 6
Texture—silty clay loam, silty clay, or clay
Reaction—moderately alkaline
Clay content—35 to 55 percent

Btk horizon:
Color—hue of 2.5YR to 5YR, value of 4 or 5, and chroma of 4 to 8
Texture—silty clay loam, silty clay, or clay
Reaction—moderately alkaline

Clay content—35 to 55 percent

BC horizon (where present):
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8
Texture—silty clay loam, silty clay, or clay
Reaction—moderately alkaline

Cr horizon:
Color—hue of 2.5YR, value of 4 to 6, and chroma of 6 to 8

Pulaski Series

Major land resource area: Northern Cross Timbers (84A)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Loamy alluvial sediments of Recent age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Low flood plains
Slope: 0 to 1 percent
Slope shape: Linear-linear
Elevation: 700 to 1,300 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Coarse-loamy, mixed, superactive, nonacid, thermic Udic Ustifluvents

Associated Soils

These are the Ashport, Cyril, Easpur, Gaddy, Gracemont, Gracemore, Port, Tribbey, and Yahola soils. Ashport, Easpur, and Port soils are at the slightly higher elevations. Ashport and Port soils have a mollic epipedon and a fine-silty textural control section. Easpur soils have a mollic epipedon and a fine-loamy textural control section. Cyril, Tribbey, and Yahola soils are in positions similar to those of the Pulaski soils. Cyril soils have a mollic epipedon. Gaddy, Gracemont, and Gracemore soils generally are on flood plains near the channels of the larger streams. Gracemont and Gracemore soils have an apparent water table at a depth of 20 to 40 inches and are calcareous throughout, and Gracemore soils have a sandy control section.

Typical Pedon

Pulaski fine sandy loam, in a cultivated area; Lincoln County, Oklahoma; about 6 miles north and 1 mile east of Chandler; 1,135 feet north and 200 feet east of the southwest corner of sec. 2, T. 15 N., R. 4 E. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 7 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine and very fine granular structure; soft, very friable; moderately acid; clear smooth boundary. (6 to 12 inches thick)
A—7 to 19 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine and very fine granular structure; slightly hard, very friable; moderately acid; gradual smooth boundary. (4 to 20 inches thick)
C1—19 to 40 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; massive; slightly hard, very friable; few thin strata of darker colored fine sandy loam in the lower part; slightly acid; gradual smooth boundary. (16 to 36 inches thick)
C2—40 to 64 inches; reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 5/6) moist; massive, slightly hard, very friable; common thin strata of loamy fine sand; slightly acid.

Range in Characteristics

Depth to bedrock: More than 72 inches
Depth to carbonates: More than 40 inches
Depth to a buried horizon: More than 30 inches

A horizon:
Color—hue of 2.5YR to 10YR, value of 4 to 7, and chroma of 2 to 6
Texture—fine sandy loam, loam, or loamy fine sand
Reaction—moderately acid to slightly alkaline
Clay content—5 to 18 percent

C horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 7, and chroma of 3 to 8
Texture—fine sandy loam, very fine sandy loam, or loam
Reaction—moderately acid to slightly alkaline
Clay content—10 to 18 percent

Renfrow Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep (fig. 8, page 64)
Drainage class: Well drained
Parent material and geologic age: Material weathered from clayey shale of Permian age

Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Summits and backslopes
Slope: 0 to 5 percent
Slope shape: Linear-linear/convex
Elevation: 900 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Frost-free days: 190 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine, mixed, superactive, thermic Udertic Paleustolls

Associated Soils

These are the Bethany, Grainola, Kingfisher, Kirkland, Masham, Piedmont, Renthin, Stoneburg, Tabler, and Zaneis soils. Bethany, Kirkland, and Tabler soils are on the higher parts of the landscape. Tabler soils have a mollic epipedon that is more than 20 inches thick. Grainola and Masham soils are typically on backslopes. They do not have a mollic epipedon and have a solum that is less than 60 inches thick. Kingfisher, Stoneburg, and Zanies soils are on the same landscape as the Renfrow soils. Kingfisher soils have a fine-silty control section. Piedmont and Renthin soils are typically on shoulders. They have a solum that is less than 60 inches thick. Stoneburg and Zaneis soils have a fine-loamy control section.

Typical Pedon

Renfrow silt loam, in an area of native range; Kay County, Oklahoma; about 4 miles south and 3 miles west of Tonkawa; 2,200 feet south and 50 feet east of the northwest corner of sec. 25, T. 25 N., R. 2 W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 9 inches; brown (7.5YR 4/2) silt loam, dark brown (7.5YR 3/2) moist; moderate medium granular structure; hard, friable; many fine roots; slightly acid; gradual smooth boundary. (5 to 12 inches thick)

BA—9 to 13 inches; reddish brown (5YR 4/3) clay loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; hard, friable; many fine roots; slightly acid; clear smooth boundary. (3 to 10 inches thick)

Btss1—13 to 25 inches; reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; moderate medium blocky structure; very hard, very firm; nearly continuous clay films on faces of peds; few slickensides; common fine roots; neutral; gradual smooth boundary. (8 to 20 inches thick)

Btss2—25 to 40 inches; reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) moist; moderate coarse blocky structure; extremely hard, very firm; nearly continuous clay films on faces of peds; common slickensides; few fine roots; calcareous at a depth of 30 inches; slightly alkaline; gradual smooth boundary. (8 to 25 inches thick)

Btss3—40 to 65 inches; red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; weak coarse blocky structure; extremely hard, very firm; patchy clay films on faces of peds; few slickensides; few fine roots; few fine and medium concretions of calcium carbonate; few fine soft rounded bodies of calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary. (0 to 33 inches thick)

BCk—65 to 75 inches; red (2.5YR 5/6) clay, red (2.5YR 4/6) moist; massive; extremely hard, very firm; calcareous; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 20 inches
Thickness of the solum: More than 60 inches
Depth to carbonates: 20 to 50 inches
Depth to bedrock: More than 80 inches
Other features: Cracks within 125 centimeters of the mineral soil surface that are 5 millimeters or more wide through a thickness of 30 centimeters or more for some time in most years; slickensides or wedge-shaped aggregates in a layer 15 centimeters or more thick that has its upper boundary within 125 centimeters of the mineral soil surface; a linear extensibility of 6.0 centimeters or more between the mineral soil surface and a depth of 100 centimeters

A horizon:
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3
Texture—silt loam, silty clay loam, clay loam, or loam
Reaction—moderately acid to slightly alkaline
Clay content—18 to 35 percent

BA horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 2 to 4
Texture—silty clay loam, clay loam, or silt loam
Reaction—slightly acid to slightly alkaline
Clay content—22 to 40 percent

Bt1 horizon:
Color—hue of 2.5YR to 5YR, value of 4 or 6, and chroma of 3 to 6
Texture—clay, silty clay, silty clay loam, or clay loam
Reaction—slightly acid to moderately alkaline
Clay content—35 to 55 percent

Bt2 horizon:
Color—hue of 2.5YR to 5YR, value of 4 or 6, and chroma of 3 to 6
Texture—clay, silty clay, silty clay loam, or clay loam
Reaction—slightly acid to moderately alkaline
Clay content—35 to 55 percent

Bt3 horizon:
Color—hue of 10R to 5YR, value of 4 or 6, and chroma of 3 to 8
Texture—clay, silty clay, silty clay loam, or clay loam
Reaction—neutral to moderately alkaline
Clay content—35 to 55 percent

BC horizon (where present):
Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 3 to 8
Texture—clay, silty clay, silty clay loam, or clay loam
Reaction—moderately alkaline and calcareous
Clay content—35 to 55 percent
Content of rock fragments, by volume—0 to 15 percent shale pebbles 2 to 25 millimeters in diameter

C horizon (where present):
Color—hue of 10R to 5YR, value of 4 or 6, and chroma of 6 to 8
Texture—clay, silty clay, silty clay loam, or clay loam
Reaction—moderately alkaline and calcareous
Clay content—35 to 55 percent
Content of rock fragments, by volume—0 to 15 percent shale pebbles 2 to 25 millimeters in diameter
Redoximorphic features—in some pedons redoximorphic accumulations and depletions in shades of brown, red, or gray

Renthin Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Deep
Drainage class: Well drained
Parent material and geologic age: Material weathered from clayey and silty shale of Permian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Summits and backslopes
Slope: 1 to 5 percent
Slope shape: Linear-convex, linear-linear
Elevation: 800 to 1,600 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Frost-free days: 190 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine, mixed, superactive, thermic Udertic Argiustolls

Associated Soils

These are the Bethany, Grainola, Grant, Huska, Kingfisher, Kirkland, Lucien, Norge, Piedmont, Renfrow, and Zaneis soils. Bethany, Kirkland, and Renfrow soils are in the higher positions, and Norge soils are in the lower positions. Bethany, Kirkland, Norge, and Renfrow soils have a solum that is more than 60 inches thick and have an argillic horizon that does not decrease in clay content by more than 20 percent within a depth of 60 inches. Also, Bethany and Kirkland soils have a mollic epipedon that is more than 20 inches thick, and Norge soils have a fine-silty control section. Grainola soils do not have a mollic epipedon. Grant and Huska soils are on landscapes similar to those of the Renthin soils. Grant soils have a fine-silty control section. Huska soils do not have a mollic epipedon and have a natric horizon. Kingfisher soils have a fine-silty control section. Lucien soils are in the lower positions. They have a solum that is 10 to 20 inches thick and have a loamy control section. Piedmont soils are on landscapes similar to those of the Renthin soils but are at lower elevations near drainage channels. Zaneis soils are on landscapes similar to those of the Renthin soils. They have a fine-loamy control section and do not have secondary calcium carbonate accumulations.

Typical Pedon

Renthin silt loam, in a native hay meadow; Oklahoma County, Oklahoma; about 10 miles west and 4 miles north of Edmond, Oklahoma; about 1,650 feet west and 800 feet south of the northeast corner of sec. 7, T. 14 N., R. 4 W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 10 inches; brown (7.5YR 4/2) silt loam, dark

brown (7.5YR 3/2) moist; moderate fine granular structure; hard, friable; many very fine and few fine roots; slightly acid; clear smooth boundary. (4 to 10 inches thick)

BA—10 to 14 inches; reddish brown (5YR 4/3) silty clay loam, dark reddish brown (5YR 3/3) moist; weak fine subangular blocky structure parting to moderate medium granular; very hard, firm; many very fine and few fine roots; patchy clay films on faces of peds; slightly acid; clear smooth boundary. (0 to 6 inches thick)

Bt—14 to 27 inches; reddish brown (5YR 4/4) silty clay, dark reddish brown (5YR 3/4) moist; weak medium prismatic structure parting to moderate medium blocky; very hard, very firm; many very fine roots; nearly continuous clay films on faces of peds; few fine black concretions; neutral; gradual smooth boundary. (4 to 20 inches thick)

Btss—27 to 35 inches; reddish brown (2.5YR 4/4) silty clay, dark reddish brown (2.5YR 3/4) moist; weak medium prismatic structure parting to moderate medium blocky; extremely hard, extremely firm; many very fine roots; few nonintersecting slickensides; nearly continuous clay films on faces of peds; few fine black concretions; slightly alkaline; gradual smooth boundary. (0 to 20 inches thick)

Btkss—35 to 43 inches; red (2.5YR 5/6) silty clay, red (2.5YR 4/6) moist; weak coarse blocky structure; extremely hard, extremely firm; common very fine roots; common nonintersecting slickensides; nearly continuous clay films on faces of peds; few fine black concretions; few masses and concretions of calcium carbonate; slight effervescence; moderately alkaline; clear wavy boundary. (6 to 38 inches thick)

Cr—43 to 60 inches; light red (2.5YR 6/6) and red (2.5YR 5/6), clayey and silty shale, red (2.5YR 5/6 and 4/6) moist; soft; laminated; moderately alkaline.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Depth to bedrock: 40 to 60 inches
Depth to carbonates: 19 to 52 inches
Clay content: More than 35 percent within a depth of 15 inches
Other features: Cracks within 125 centimeters of the mineral soil surface that are 5 millimeters or more wide through a thickness of 30 centimeters or more for some time in most years; slickensides or wedge-shaped aggregates in a layer 15 centimeters or more thick that has its upper boundary within 125 centimeters of the mineral soil surface; a linear extensibility of 6.0 centimeters or more between the mineral soil surface and either a depth of 100 centimeters or a paralithic contact

A horizon:
Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3
Texture—typically silt loam, but commonly silty clay loam or clay loam in cultivated areas
Reaction—slightly acid or neutral
Clay content—20 to 35 percent

BA horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 2 to 4
Texture—silty clay loam or clay loam
Reaction—slightly acid to slightly alkaline
Clay content—32 to 40 percent

Bt horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6
Texture—silty clay loam, silty clay, or clay
Reaction—neutral to moderately alkaline
Clay content—35 to 45 percent

Btss horizon:
Color—hue of 2.5YR or 5YR and value and chroma of 4 to 6
Texture—silty clay or clay
Reaction—slightly alkaline or moderately alkaline
Clay content—40 to 55 percent

Btkss horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8
Texture—silty clay loam, silty clay, or clay
Reaction—moderately alkaline
Clay content—35 to 55 percent

BC horizon (where present):
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8
Texture—silty clay loam, silty clay, or clay
Reaction—moderately alkaline
Clay content—35 to 55 percent

Stephenville Series

Major land resource area: Northern Cross Timbers (84A)
Depth class: Moderately deep
Drainage class: Well drained
Parent material and geologic age: Material weathered from sandstone of Permian age

Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Summits and backslopes
Slope: 1 to 25 percent
Slope shape: Linear-convex
Elevation: 1,000 to 1,500 feet
Mean annual precipitation: 30 to 38 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 48 to 64

Taxonomic class: Fine-loamy, siliceous, active, thermic Ultic Haplustalfs

Associated Soils

These are the Darnell, Darsil, Dougherty, Galey, Harrah, Konawa, Littleaxe, Niotaze, and Stidham soils. Darnell and Darsil soils are on ridgetops. They have a solum that is less than 20 inches thick and do not have a Bt horizon. Dougherty, Galey, Harrah, Konawa, Littleaxe, and Stidham soils are on landscapes similar to those of the Stephenville soils. Niotaze soils are on side slopes, generally at the lower elevations. They have a fine textured control section.

Typical Pedon

Stephenville fine sandy loam, on a south-facing slope on a ridge crest, in an area of rangeland; Oklahoma County, Oklahoma; about 5 miles east of Edmond; 300 feet south and 50 feet east of the northwest corner of sec. 35, T. 14 N., R. 2 W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 4 inches; brown (7.5YR 5/2) fine sandy loam, dark brown (7.5YR 4/2) moist; weak fine granular structure; slightly hard, very friable; many fine and medium roots; slightly acid; gradual smooth boundary. (3 to 8 inches thick)

E—4 to 9 inches; light brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; weak fine granular structure; slightly hard, very friable; many fine and medium roots; strongly acid; clear smooth boundary. (0 to 13 inches thick)

Bt1—9 to 30 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate medium prismatic structure parting to weak medium subangular blocky; very hard, firm; common very fine and fine roots inside peds and common fine and medium roots between peds; clay films on faces of peds; very strongly acid; gradual smooth boundary. (5 to 25 inches thick)

Bt2—30 to 38 inches; red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; weak medium prismatic structure parting to weak medium subangular blocky; very hard, firm; few very fine and fine roots inside peds and common fine and medium roots between peds; patchy clay films on faces of peds; strongly acid; abrupt irregular boundary. (0 to 12 inches thick)

Cr—38 to 50 inches; light red (2.5YR 6/6), soft sandstone; slightly acid; few fine and medium roots in seams or fractures.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to bedrock: 20 to 40 inches

A horizon:
Color—hue of 5YR to 10YR, value of 3 to 7, and chroma of 2 to 6
Texture—fine sandy loam or loamy fine sand
Reaction—strongly acid to slightly acid
Clay content—5 to 20 percent

E horizon:
Color—hue of 5YR to 10YR, value of 5 to 7, and chroma of 2 to 6
Texture—fine sandy loam or loamy fine sand
Reaction—strongly acid to slightly acid
Clay content—5 to 20 percent

Bt horizon:
Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 3 to 8
Texture—sandy clay loam or fine sandy loam
Reaction—very strongly acid to slightly acid
Clay content—18 to 35 percent

BC horizon (where present):
Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8
Texture—fine sandy loam
Reaction—strongly acid to slightly acid
Clay content—18 to 35 percent

Cr horizon:
Kind of bedrock—reddish sandstone

Teller Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Loamy sediments of Pleistocene age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland

Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Terraces
Position: Treads or summits
Slope: 0 to 8 percent
Slope shape: Linear-convex, linear-linear, or convex-linear
Elevation: 950 to 1,300 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine-loamy, mixed, active, thermic Udic Argiustolls

Associated Soils

These are the Dougherty, Konawa, Minco, Navina, Norge, Pond Creek, Slaughterville, and Vanoss soils. Dougherty and Konawa soils are in the slightly higher positions. They do not have a mollic epipedon. Minco soils are in the higher positions or in areas between terraces. They do not have an argillic horizon. Navina soils are in positions similar to those of the Teller soils. Norge, Pond Creek, and Vanoss soils are in the slightly lower positions. They have a fine-silty control section. Slaughterville soils are in the slightly lower positions and are nearer the major streams than the Teller soils. They do not have an argillic horizon.

Typical Pedon

Teller fine sandy loam, in a cultivated area; Payne County, Oklahoma; about 1 mile west and 1 mile north of Perkins; 2,100 feet north and 80 feet east of the southwest corner of sec. 36, T. 18 N., R. 2 E. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 6 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine and medium granular structure; slightly hard, very friable; moderately acid; clear smooth boundary. (0 to 11 inches thick)

A—6 to 15 inches; brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; moderate medium and fine granular structure; slightly hard, friable; moderately acid; gradual smooth boundary. (6 to 15 inches thick)

BA—15 to 20 inches; brown (7.5YR 4/4) fine sandy loam, dark brown (7.5YR 3/4) moist; weak medium subangular blocky structure parting to moderate medium granular; hard, friable; moderately acid; gradual smooth boundary. (0 to 8 inches thick)

Bt1—20 to 32 inches; yellowish red (5YR 4/6) sandy clay loam, yellowish red (5YR 3/6) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm; thin nearly continuous clay films on faces of peds; moderately acid; gradual smooth boundary. (6 to 20 inches thick)

Bt2—32 to 42 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, firm; patchy clay films on faces of peds; moderately acid; gradual smooth boundary. (6 to 20 inches thick)

Bt3—42 to 60 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure; hard, friable; patchy clay films on faces of peds; moderately acid; diffuse smooth boundary. (10 to 30 inches thick)

C—60 to 70 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure; hard, friable; patchy clay films on faces of peds; moderately acid.

Range in Characteristics

Thickness of the mollic epipedon: Less than 20 inches
Thickness of the solum: More than 50 inches
Depth to bedrock: More than 60 inches

Ap and A horizons:
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3
Texture—fine sandy loam, loam, or very fine sandy loam
Reaction—moderately acid or slightly acid
Clay content—10 to 20 percent

BA horizon:
Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4
Texture—fine sandy loam, loam, or very fine sandy loam
Reaction—moderately acid or slightly acid
Clay content—18 to 30 percent

Bt1 and Bt2 horizons:
Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8
Texture—sandy clay loam or clay loam
Reaction—moderately acid to neutral
Clay content—18 to 30 percent

Bt3 horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8
Texture—fine sandy loam, loam, clay loam, or very fine sandy loam
Reaction—moderately acid to neutral
Clay content—10 to 20 percent

BC horizon (where present):
Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8
Texture—loam, fine sandy loam, or very fine sandy loam
Reaction—slightly acid to slightly alkaline
Clay content—10 to 20 percent

C horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8
Texture—loam, fine sandy loam, or very fine sandy loam
Reaction—moderately acid to slightly alkaline
Clay content—10 to 20 percent

Teval Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Loamy sediments of Pleistocene age
Landscape: Uplands
Landform: Terraces
Position: Side slopes
Slope: 0 to 8 percent
Slope shape: Convex-convex
Elevation: 900 to 1,300 feet
Mean annual precipitation: 30 to 38 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free days: 190 to 230
Thornthwaite PE index: 46 to 58

Taxonomic class: Fine-loamy, mixed, active, thermic Udic Argiustolls

Associated Soils

These are the Dougherty, Konawa, Norge, and Teller soils. Dougherty, Konawa, and Norge soils are in the slightly higher positions. Dougherty and Konawa soils do not have a mollic epipedon or a gravelly substratum. Norge soils are fine-silty and do not have a gravelly substratum. Teller soils are adjacent to the Teval soils. They do not have a gravelly substratum.

Typical Pedon

Teval loam, 0 to 8 percent slopes, in an area of native range; Oklahoma County, Oklahoma; about 7 miles west and 3.5 miles north of Edmond, Oklahoma; 2,580 feet north and 1,050 feet west of the southeast corner of sec. 10, T. 14 N., R. 4 W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 7 inches; dark brown (7.5YR 4/3) loam, dark brown (7.5YR 3/3) moist; moderate fine granular structure; hard, friable; many very fine and few fine roots; common very fine pores; moderately acid; clear smooth boundary. (4 to 10 inches thick)

BA—7 to 11 inches; reddish brown (5YR 4/3) clay loam, dark reddish brown (5YR 3/3) moist; weak fine subangular blocky structure parting to moderate medium granular; hard, firm; many very fine and few fine roots; common very fine pores; slightly acid; clear smooth boundary. (3 to 6 inches thick)

Bt1—11 to 20 inches; reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; moderate fine prismatic structure parting to moderate medium subangular blocky; very hard, very firm; many very fine and few fine roots; many very fine pores; common distinct clay films on faces of peds; slightly acid; gradual smooth boundary. (4 to 20 inches thick)

Bt2—20 to 32 inches; reddish brown (2.5YR 4/4) clay loam, dark reddish brown (2.5YR 3/4) moist; moderate medium prismatic structure parting to moderate medium blocky; very hard, very firm; common very fine and few fine roots; common very fine pores; common distinct clay films on faces of peds; neutral; gradual smooth boundary. (8 to 18 inches thick)

Bt3—32 to 38 inches; reddish brown (2.5YR 4/4) clay loam, dark reddish brown (2.5YR 3/4) moist; moderate medium prismatic structure parting to weak medium blocky; very hard, very firm; common very fine roots; few very fine pores; few distinct clay films on faces of peds; 5 percent, by volume, rock fragments 2 to 76 millimeters in diameter; neutral; clear wavy boundary. (6 to 12 inches thick)

2C—38 to 50 inches; stratified, red (2.5YR 5/6) sandy loam, fine sandy loam, loam, silt loam, clay loam, and gravelly sandy loam, red (2.5YR 4/6) moist; massive; slightly hard, very friable; few very fine roots; strata are 1/4 inch to 3 inches thick; strongly effervescent; 15 percent, by volume, rock fragments 2 to 76 millimeters in diameter; moderately alkaline; gradual smooth boundary. (9 to 22 inches thick)

3C—50 to 96 inches; stratified, red (2.5YR 5/6) sandy loam, fine sandy loam, loam, silt loam, clay loam, and very gravelly sandy loam, red (2.5YR 4/6) moist; massive; slightly hard, very friable; few very fine roots; strata are 1/4 inch to 3 inches thick; strongly effervescent; 35 percent, by volume, rock fragments 2 to 76 millimeters in diameter; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: Less than 20 inches
Thickness of the solum: 30 to 50 inches
Depth to bedrock: More than 60 inches

A horizon:
Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3
Texture—loam or silt loam
Reaction—moderately acid to neutral
Roots—many very fine and few fine
Pores—common very fine
Clay content—15 to 26 percent
Content of rock fragments, by volume—0 to 2 percent
Thickness—4 to 10 inches

BA horizon:
Color—hue of 5YR, value of 4 or 5, and chroma of 3 or 4
Texture—loam, sandy clay loam, or clay loam
Reaction—moderately acid to slightly alkaline
Roots—many very fine and few fine
Pores—common very fine
Clay content—18 to 30 percent
Content of rock fragments, by volume—0 to 2 percent
Thickness—3 to 6 inches

Bt horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 or 6
Texture—loam, sandy clay loam, or clay loam
Reaction—slightly acid to moderately alkaline
Roots—common or many very fine and few fine
Pores—few to many very fine
Clay content—18 to 35 percent
Content of rock fragments, by volume—0 to 14 percent
Thickness—4 to 20 inches

2C horizon:
Color—hue of 2.5YR, value of 4 to 6, and chroma of 4 or 6
Texture—stratified fine sand, sandy loam, fine sandy loam, loam, silt loam, sandy clay loam, clay loam, gravelly sandy loam, gravelly fine sandy loam, gravelly loam, or gravelly sandy clay loam
Thickness of the strata—1/4 inch to 6 inches
Reaction—slightly alkaline to moderately alkaline
Roots—few very fine
Clay content—5 to 15 percent
Content of rock fragments, by volume—15 to 34 percent
Thickness—9 to 22 inches

3C horizon:
Color—hue of 2.5YR, value of 4 to 6, and chroma of 4 or 6
Texture—stratified fine sand, sandy loam, fine sandy loam, loam, silt loam, sandy clay loam, clay loam, very gravelly sandy loam, very gravelly fine sandy loam, very gravelly sandy clay loam, or very gravelly clay loam
Thickness of the strata—1/4 inch to 6 inches
Reaction—slightly alkaline to moderately alkaline
Roots—few very fine
Clay content—5 to 15 percent
Content of rock fragments, by volume—35 to 60 percent

Tribbey Series

Major land resource area: Northern Cross Timbers (84A)
Depth class: Very deep
Drainage class: Somewhat poorly drained
Parent material and geologic age: Loamy and sandy alluvium of Recent age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Low flood plains
Slope: 0 to 2 percent
Slope shape: Concave-concave, linear-concave
Elevation: 800 to 1,200 feet
Mean annual precipitation: 30 to 40 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 48 to 64

Taxonomic class: Coarse-loamy, mixed, superactive, nonacid, thermic Oxyaquic Udifluvents

Associated Soils

These are the Pulaski soils, which generally are in the slightly higher areas.

Typical Pedon

Tribbey fine sandy loam, in an improved pasture; Pottawatomie County, Oklahoma; about 5 miles west and 1 mile south of Bethel; 1,400 feet south and 200 feet east of the northwest corner of sec. 33, T. 10 N., R. 2 E. (Colors are for moist soil unless otherwise indicated.)

A—0 to 10 inches; red (2.5YR 4/6) fine sandy loam, red (2.5YR 5/6) dry; weak fine granular structure; slightly hard, very friable; faint stratification; slightly

alkaline; clear smooth boundary. (4 to 14 inches thick)

C1—10 to 40 inches; red (2.5YR 4/6) fine sandy loam; massive; slightly hard, very friable; common thin strata of darker and lighter colored loamy fine sand and fine sand; saturated with water at a depth of 30 inches; moderately alkaline; clear smooth boundary. (15 to 60 inches thick)

C2—40 to 50 inches; red (2.5YR 4/6) fine sandy loam; massive; slightly hard, very friable; many thin strata of lighter colored loamy fine sand and fine sand; saturated with water; moderately alkaline; clear smooth boundary. (0 to 50 inches thick)

Ab—50 to 65 inches; very dark grayish brown (10YR 3/2) loam; common fine distinct red (2.5YR 4/6) iron concentrations and gray (10YR 5/1) iron depletions; weak fine granular structure; slightly hard, friable; saturated with water; moderately alkaline.

Range in Characteristics

Depth to a buried horizon: 30 to 55 inches

Other features: Saturated in one or more layers within 100 centimeters of the mineral soil surface for 1 month or more per year in 6 or more years out of 10

A horizon:

Color—hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 3 to 8

Texture—fine sandy loam, loamy fine sand, loam, or clay loam

Reaction—moderately acid to moderately alkaline

Clay content—5 to 35 percent

C horizon:

Color—hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 4 to 8

Texture—fine sandy loam, loam, or loamy very fine sand to a depth of 40 inches and loamy fine sand, fine sandy loam, or loam below a depth of 40 inches

Reaction—moderately acid to moderately alkaline

Clay content—5 to 18 percent

Redoximorphic features—gray, brown, or red depletions and concentrations below a depth of 30 inches in some pedons

Ab horizon:

Color—hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 to 4

Texture—loam, clay loam, sandy clay loam, or fine sandy loam

Reaction—neutral to moderately alkaline

Clay content—15 to 30 percent

Redoximorphic features—gray, brown, or red depletions and concentrations

Cb horizon (where present):

Color—hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 to 4

Texture—loam, clay loam, sandy clay loam, or fine sandy loam

Reaction—neutral to moderately alkaline

Clay content—15 to 30 percent

Redoximorphic features—gray, brown, or red depletions and concentrations

Vanoss Series

Major land resource area: Central Rolling Red Prairies (80A)

Depth class: Very deep

Drainage class: Well drained

Parent material and geologic age: Loamy alluvium of Pleistocene age

Physiographic region: Interior Lowlands

Physiographic province: Central Lowland

Physiographic subprovince: Osage Plain

Landscape: Uplands

Landform: Terraces

Position: Treads or summits

Slope: 0 to 8 percent

Slope shape: Linear-linear

Elevation: 900 to 1,300 feet

Mean annual precipitation: 26 to 40 inches

Mean annual air temperature: 58 to 64 degrees F

Frost-free days: 200 to 230

Thornthwaite PE index: 44 to 64

Taxonomic class: Fine-silty, mixed, superactive, thermic Udic Argiustolls

Associated Soils

These are the Bethany, Minco, Norge, and Teller soils. Bethany soils have a fine textured control section. They are on slightly concave, broad flats. Minco soils have a coarse-silty control section and do not have a Bt horizon. They generally are on side slopes and are closer to river channels than the Vanoss soils. Norge soils are on slopes similar to those of the Vanoss soils and on the adjacent side slopes. Teller soils generally are on the slightly higher ridges.

Typical Pedon

Vanoss loam, in a cultivated area; Pottawatomie County, Oklahoma; about one-half mile west of Shawnee, Oklahoma; 1,400 feet south and 2,200 feet

east of the northwest corner of sec. 24, T. 10 N., R. 3 E. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 7 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; strongly acid; abrupt smooth boundary. (6 to 13 inches thick)

A—7 to 11 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate very fine granular structure; slightly hard, friable; strongly acid; clear smooth boundary. (4 to 10 inches thick)

BA—11 to 15 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable; moderately acid; clear smooth boundary. (0 to 8 inches thick)

Bt1—15 to 27 inches; dark yellowish brown (10YR 4/4) clay loam, dark yellowish brown (10YR 3/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, friable; continuous clay films on faces of peds; moderately acid; clear smooth boundary. (8 to 36 inches thick)

Bt2—27 to 37 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; very hard, friable; continuous clay films on faces of peds; moderately acid; clear smooth boundary. (0 to 12 inches thick)

Bt3—37 to 50 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; hard, friable; patchy clay films on faces of peds; moderately acid; gradual smooth boundary. (8 to 22 inches thick)

C—50 to 95 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; many medium faint grayish brown (10YR 5/2), brown (10YR 5/3), and yellowish brown (10YR 5/6) redoximorphic features; hard, friable; moderately acid.

Range in Characteristics

Thickness of the mollic epipedon: Less than 20 inches
Thickness of the solum: 40 to more than 60 inches

Ap and A horizons:
Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 1 to 3
Texture—loam or silt loam
Reaction—strongly acid to neutral
Clay content—15 to 26 percent

BA horizon:
Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4
Texture—loam, silt loam, silty clay loam, or clay loam
Reaction—strongly acid to neutral
Clay content—18 to 30 percent

Bt1 and Bt2 horizons:
Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6
Texture—clay loam or silty clay loam
Reaction—strongly acid to neutral
Clay content—27 to 35 percent
Redoximorphic features—red or brown concentrations in some pedons

Bt3 horizon:
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 6
Texture—loam, silt loam, clay loam, or silty clay loam
Reaction—moderately acid to neutral
Clay content—18 to 35 percent
Redoximorphic features—red or brown concentrations in some pedons

BC and C horizons:
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 8
Texture—loam, silt loam, clay loam, or silty clay loam
Reaction—moderately acid to neutral
Clay content—10 to 35 percent
Other features—buried horizons of fine sandy loam or sandy clay loam in some pedons

Watonga Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Moderately well drained
Parent material and geologic age: Loamy and clayey alluvium of Pleistocene age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: High flood plains
Slope: 0 to 1 percent
Slope shape: Linear-linear/concave
Elevation: 800 to 1,100 feet
Mean annual precipitation: 28 to 40 inches
Mean annual air temperature: 57 to 64 degrees F

Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine, smectitic, thermic Udic Haplusterts

Associated Soils

These are the Brewer, Canadian, Dale, McLain, and Reinach soils. All of these soils are on landscapes similar to those of the Watonga soils. Brewer and McLain soils have an argillic horizon. Canadian soils have a coarse-loamy control section. Dale soils have a fine-silty control section. Reinach soils have a coarse-silty control section.

Typical Pedon

Watonga silty clay, in a cultivated area, in the center of a microhigh; Canadian County, Oklahoma; about 1 mile south and 3 miles east of Yukon; 4,500 feet east and 50 feet north of the southwest corner of sec. 23, T. 12 N., R. 5 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 8 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; moderate fine granular structure; very hard, very firm; few fine and medium roots; calcareous; slightly alkaline; abrupt smooth boundary. (0 to 10 inches thick)

A—8 to 22 inches; very dark gray (10YR 3/1) silty clay, black (10YR 2/1) moist; strong fine granular and subangular blocky structure; very hard, very firm; few fine and medium roots; slightly effervescent; moderately alkaline; gradual wavy boundary. (12 to 34 inches thick)

Bssk—22 to 50 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; moderate coarse blocky structure; extremely hard, extremely firm; shiny pressure faces on peds; few slickensides; few parallelepipeds; dark soil material with moist color of black (10YR 2/1) in some cracks; common fine and medium calcium carbonate concretions; strongly effervescent; moderately alkaline; gradual wavy boundary. (14 to 36 inches thick)

Ck—50 to 72 inches; light brown (7.5YR 6/4) silty clay, dark brown (7.5YR 4/4) moist; massive; extremely hard, extremely firm; few reddish brown (5YR 5/4) bodies of silty clay; common medium and coarse calcium carbonate concretions; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 38 to 60 inches
Other features: Parallelepiped-shaped aggregates are evident when the soils are nearly dry but are not evident when the soils are moist. Slickensides are within a depth of 40 inches. When dry, the soils have cracks ranging from 1 to 2 centimeters in width at a depth of 20 inches. The distance between the center of a microhigh and the center of a microlow ranges from 8 to 12$^{1}/_{2}$ feet.

A horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 1
Texture—clay, silty clay, clay loam, or silty clay loam
Reaction—slightly alkaline or moderately alkaline and slightly effervescent on the microhighs; neutral to moderately alkaline on the microlows
Clay content—35 to 60 percent
Thickness—ranging from 12 inches on the microhighs to 40 inches on the microlows

Bssk horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4
Texture—clay, silty clay, clay loam, or silty clay loam
Reaction—slightly alkaline or moderately alkaline and slightly effervescent to strongly effervescent
Clay content—35 to 60 percent
Other features—in most pedons cracks that are filled with dark material like that of the A horizon

Ck horizon:
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 4
Texture—clay, silty clay, clay loam, or silty clay loam
Reaction—slightly alkaline or moderately alkaline and slightly effervescent to strongly effervescent
Clay content—35 to 50 percent

Waurika Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Somewhat poorly drained
Parent material and geologic age: Clayey and loamy old alluvium or residuum weathered from shale of Permian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Terraces
Position: Treads or summits

Slope: 0 to 1 percent
Slope shape: Linear-linear
Elevation: 900 to 1,300 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Thornthwaite PE index: 40 to 64

Taxonomic class: Fine, smectitic, thermic Vertic Argialbolls

Associated Soils

These are the Aydelotte, Bethany, Chickasha, Foard, Grainola, Kirkland, Lucien, Renfrow, Seminole, and Tabler, soils. Aydelotte, Chickasha, Grainola, Lucien, Renfrow, and Seminole soils are in the more sloping convex areas. Bethany, Foard, Kirkland, and Tabler soils are on landscapes similar to those of the Waurika soils. None of the associated soils have an albic horizon. Aydelotte soils do not have a mollic epipedon. Chickasha soils have a fine-loamy control section. Foard and Seminole soils have a natric horizon. Grainola soils have a solum that is less than 40 inches deep over shale bedrock. Lucien soils have a solum that is less than 20 inches deep over sandstone bedrock.

Typical Pedon

Waurika silt loam, in a cultivated area; Cotton County, Oklahoma; about 1 mile south and 3 miles east of Temple; 190 feet south and 100 feet west of the northeast corner of sec. 31, T. 3 S., R. 9 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; many fine roots; moderately acid; clear smooth boundary. (0 to 8 inches thick)

A—6 to 10 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; few fine roots; few wormcasts; neutral; gradual smooth boundary. (0 to 10 inches thick)

E—10 to 12 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; massive; porous; slightly hard, friable; neutral abrupt wavy boundary. (1 to 5 inches thick)

Btss—12 to 32 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium blocky structure; very hard, very firm; nearly continuous clay films on faces of peds; many slickensides; few lime concretions; neutral; gradual smooth boundary. (12 to 25 inches thick)

Btk—32 to 57 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak medium blocky structure; very hard, firm; few black concretions; common lime concretions; few films and masses of calcium carbonate; calcareous; slightly alkaline; gradual smooth boundary. (20 to 30 inches thick)

C—57 to 72 inches; light gray (10YR 7/2) clay loam, light brownish gray (10YR 6/2) moist; coarsely streaked and mottled with reddish yellow carbonates; calcareous; slightly alkaline.

Range in Characteristics

Thickness of the solum: 40 to more than 60 inches
Depth to bedrock: More than 60 inches
Depth to carbonates: 24 to 48 inches
Other features: In the A or E horizon, an electrical conductivity of 0 to 2 mmhos/cm in the saturation extract and an SAR of 0 to 4; in the Btk or C horizon, an SAR of 8 to 20 and an electrical conductivity of 0 to 8 mmhos/cm in the saturation extract

A horizon:
Color—hue of 7.5YR, value of 3 to 5, and chroma of 2; hue of 10YR, value of 3 to 5, and chroma of 1 or 2; or hue of 2.5YR, value of 3 to 5, and chroma of 2
Texture—silt loam or loam
Reaction—moderately acid to neutral
Clay content—15 to 25 percent

E horizon:
Color—hue of 7.5YR, value of 4 to 6, and chroma of 2; hue of 10YR, value of 4 to 6, and chroma of 1 or 2; or hue of 2.5YR, value of 4 to 6, and chroma of 2
Texture—loam or silt loam
Reaction—moderately acid to neutral
Clay content—15 to 25 percent

Btss horizon:
Color—hue of 7.5YR, value of 3 to 5, and chroma of 2; hue of 10YR, value of 3 to 5, and chroma of 1 to 3; or hue of 2.5Y, value of 3 to 5, and chroma of 2
Texture—clay, silty clay, or silty clay loam
Reaction—slightly acid to moderately alkaline
Clay content—35 to 60 percent
Redoximorphic features—brown or gray concentrations or depletions in some pedons
Other features—electrical conductivity of 0 to 4 mmhos/cm in the saturation extract and an SAR of 4 to 10

Btk horizon:
Color—hue of 7.5YR, value of 4 or 5, and chroma

of 2; hue of 10YR, value of 4 or 5, and chroma of 1 to 3; or hue of 2.5Y, value of 4 or 5, and chroma of 2
Texture—clay loam, silty clay loam, silty clay, or clay
Reaction—slightly alkaline or moderately alkaline
Clay content—30 to 50 percent
Redoximorphic features—brown or gray concentrations or depletions in some pedons

BC horizon (where present):
Color—hue of 7.5YR, value of 4 or 5, and chroma of 2; hue of 10YR, value of 4 or 5, and chroma of 1 to 3; or hue of 2.5Y, value of 4 or 5, and chroma of 2
Texture—clay loam, silty clay loam, silty clay, or clay
Reaction—slightly alkaline or moderately alkaline
Clay content—30 to 50 to percent
Redoximorphic features—brown or gray concentrations or depletions in some pedons

C horizon:
Color—hue of 7.5YR, value of 4 or 5, and chroma of 2 to 4; hue of 10YR, value of 4 to 7, and chroma of 1 to 4; or hue of 2.5Y, value of 4 to 7, and chroma of 2
Texture—clay loam or silty clay loam
Reaction—slightly alkaline or moderately alkaline
Redoximorphic features—brown, yellow, gray, or red concentrations or depletions in some pedons

Yahola Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Calcareous, loamy alluvium of Recent age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Low flood plains
Slope: 0 to 2 percent
Slope shape: Linear-linear
Elevation: 800 to 1,300 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free days: 190 to 230
Thornthwaite PE index: 44 to 64
Taxonomic class: Coarse-loamy, mixed, superactive, calcareous, thermic Udic Ustifluvents

Associated Soils

These are the Canadian, Dale, Gaddy, Gracemont, Gracemore, Miller, Port, Pulaski, and Reinach soils. Canadian and Dale soils have a mollic epipedon. They are in the slightly higher areas. Gaddy soils are in the slightly lower areas. They are loamy fine sand or coarser textured throughout the textural control section. Gracemont and Gracemore soils have a water table within 40 inches of the surface. They are in the slightly lower areas. Miller and Port soils are near the Yahola soils. They have a mollic epipedon. Also, Miller soils have a fine textured control section, and Port soils have a fine-silty textural control section. Pulaski soils are near the Yahola soils. Reinach soils are in the higher areas. They have a mollic epipedon and a coarse-silty textural control section.

Typical Pedon

Yahola fine sandy loam; Jefferson County, Oklahoma; about 7 miles west and 1 mile north of Ryan; about 2,000 feet north and 200 feet east of the southwest corner of sec. 18, T. 6 S., R. 8 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 11 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine granular structure; soft, very friable; calcareous; moderately alkaline; gradual smooth boundary.
C1—11 to 40 inches; reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 5/6) moist; massive; slightly hard, very friable; thin strata of loamy fine sand and silt loam in the lower part; calcareous; moderately alkaline; gradual smooth boundary.
C2—40 to 56 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; massive; slightly hard, friable; calcareous; moderately alkaline; gradual smooth boundary.
C3—56 to 72 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; massive; slightly hard, very friable; thin strata of loamy fine sand to clay loam; calcareous; moderately alkaline.

Range in Characteristics

A horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 7 (3 to 6 moist), and chroma of 2 to 6. Where the value is 5.5 or less (3 moist), chroma is 3.5 or

less, the horizon is more than 10 inches thick, and the content of organic matter is less than 1 percent.
Texture—loamy fine sand, fine sandy loam, very fine sandy loam, or loam. (The layers of loamy fine sand are less than 12 inches thick.)
Reaction—slightly alkaline or moderately alkaline and typically calcareous

C horizon:
Color—hue of 2.5YR to 7.5YR, value of 5 to 7 (4 to 6 moist), and chroma of 3 to 8
Texture—fine sandy loam, very fine sandy loam, or loam within a depth of 40 inches and fine sandy loam, loam, silt loam, or loamy fine sand below a depth of 40 inches; also, thin strata of coarser or finer textured material throughout the horizon
Clay content—5 to 18 percent within a depth of 40 inches
Reaction—moderately alkaline and calcareous

Zaneis Series

Major land resource area: Central Rolling Red Prairies (80A)
Depth class: Deep (fig. 9, page 64)
Drainage class: Well drained
Parent material and geologic age: Material weathered from interbedded sandstone and shale of Permian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Summits and backslopes
Slope: 0 to 8 percent
Slope shape: Linear-convex or convex-convex
Elevation: 900 to 1,200 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Fine-loamy, siliceous, active, thermic Udic Argiustolls

Associated Soils

These are the Bethany, Chickasha, Coyle, Grainola, Loco, Lucien, Mulhall, Nash, Renfrow, Stephenville, and Teller soils. Bethany soils have a fine textured control section. They are on the slightly higher broad flats. Chickasha and Coyle soils are on landscapes similar to those of the Zaneis soils. Grainola soils do not have a mollic epipedon, have a fine textured control section, and have a solum that is less than 40 inches thick. They are on side slopes. Loco and Lucien soils have a solum that is less than 20 inches thick and do not have a Bt horizon. They generally are on ridge crests and the upper side slopes. Mulhall soils are on the slightly lower side slopes and foot slopes. Nash soils have a coarse-silty control section and do not have a Bt horizon. They generally are on landscapes similar to those of the Zaneis soils. Renfrow soils have a fine textured control section. They are on the slightly higher convex ridge crests. Stephenville soils do not have a mollic epipedon and have a solum that is less than 40 inches thick. They support savannah vegetation. They are on landscapes similar to those of the Zaneis soils. Teller soils generally are in the slightly lower areas and are closer to stream channels that the Zaneis soils.

Typical Pedon

Zaneis loam, in a cultivated area; Oklahoma County, Oklahoma; about 1 mile east and 5 miles north of Edmond; 100 feet south and 1,000 feet east of the northwest corner of sec. 6, T. 14 N., R. 2 W. (Colors are for dry soil unless otherwise indicated.)

A1—0 to 6 inches; dark brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; weak medium platy structure parting to weak fine granular; slightly hard, very friable; many very fine and few fine roots; many very fine and fine continuous tubular pores; moderately acid; abrupt smooth boundary. (0 to 10 inches thick)
A2—6 to 12 inches; dark brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, very friable; many very fine and few fine roots; many very fine and fine continuous tubular pores; moderately acid; clear smooth boundary. (4 to 14 inches thick)
BA—12 to 19 inches; dark brown (7.5YR 4/3) loam, dark brown (7.5YR 3/3) moist; weak fine prismatic structure parting to weak fine subangular blocky; hard, firm; many very fine and few fine and medium roots; common very fine and fine continuous tubular pores; moderately acid; gradual smooth boundary. (0 to 7 inches thick)
Bt1—19 to 31 inches; brown (7.5YR 5/3) clay loam, dark brown (7.5YR 4/3) moist; moderate medium prismatic structure parting to moderate medium blocky; very hard, very firm; many very fine and

few fine roots; common very fine and fine continuous tubular pores; common distinct continuous clay films on vertical and horizontal faces of peds; slightly acid; gradual wavy boundary. (4 to 18 inches thick)

Bt2—31 to 39 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; common medium distinct red (2.5YR 4/6) redoximorphic concentrations; moderate coarse prismatic structure parting to moderate medium blocky; very hard, very firm; common very fine roots; common very fine and fine continuous tubular pores; common distinct continuous clay films on vertical and horizontal faces of peds; few fine iron-manganese concretions; moderately acid; gradual wavy boundary. (6 to 23 inches thick)

Bt3—39 to 48 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; common coarse prominent olive yellow (5Y 6/6), reddish brown (2.5YR 5/4), and brown (7.5YR 5/3) redoximorphic concentrations; weak coarse prismatic structure parting to weak medium subangular blocky; hard, firm; common very fine roots; many very fine and common fine continuous tubular pores; common distinct discontinuous clay films on vertical and horizontal faces of peds; common fine iron-manganese concretions; brown (7.5YR 4/3) material in root channels; slightly acid; gradual wavy boundary. (0 to 24 inches thick)

Bt4—48 to 55 inches; red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; common medium distinct dark red (2.5YR 3/6) redoximorphic concentrations; weak coarse prismatic structure parting to weak coarse subangular blocky; hard, firm; few very fine roots; few very fine, many fine, and common medium continuous tubular pores; common faint discontinuous clay films on vertical faces of peds; few fine iron-manganese concretions; brown (7.5YR 4/3) material along root channels; slightly acid; clear wavy boundary. (0 to 15 inches thick)

BC—55 to 59 inches; red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; few medium distinct dark red (10R 3/6) redoximorphic concentrations; weak coarse subangular blocky structure; hard, friable; few very fine roots; common very fine and many fine continuous tubular pores; brown (7.5YR 4/3) material along root channels; 10 percent, by volume, weathered sandstone fragments; slightly acid; abrupt wavy boundary. (0 to 10 inches thick)

Cr—59 to 65 inches; red (2.5YR 4/6), soft, laminated sandstone, dark red (2.5YR 3/6) moist; slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: Less than 20 inches
Thickness of the solum: 40 to 60 inches
Depth to bedrock: 40 to 60 inches

A or Ap horizon:
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3
Texture—loam or fine sandy loam
Reaction—moderately acid to neutral
Clay content—10 to 26 percent

BA horizon:
Color—hue of 5YR or 7.5YR, value of 4, and chroma of 2 to 4
Texture—loam or clay loam
Reaction—moderately acid to neutral
Clay content—18 to 30 percent

Bt1 horizon:
Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4
Texture—loam, clay loam, or sandy clay loam
Reaction—moderately acid to slightly alkaline
Clay content—18 to 30 percent

Bt2 horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 6
Texture—clay loam or sandy clay loam
Reaction—moderately acid to slightly alkaline
Clay content—20 to 38 percent

Bt3 horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8
Texture—clay loam or sandy clay loam
Reaction—slightly acid to moderately alkaline
Clay content—20 to 38 percent
Redoximorphic features—red or brown concentrations

Bt4 horizon:
Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8
Texture—fine sandy loam, clay loam, or sandy clay loam
Reaction—moderately acid to slightly alkaline
Clay content—18 to 30 percent
Redoximorphic features—red or brown concentrations

BC horizon:

Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8

Texture—fine sandy loam, clay loam, or sandy clay loam

Reaction—moderately acid to slightly alkaline

Cr horizon:

Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8

Kind of bedrock—weathered sandstone

Reaction—slightly acid to slightly alkaline

Detailed Soil Map Units

The map units on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given in Part II of this survey.

A map unit delineation on the detailed soil maps represents an area on the landscape and consists of one or more soils or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, are mapped without areas of minor components of other taxonomic classes. Consequently, map units are made up of the soils or miscellaneous areas for which they are named and some areas of included soils that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are contrasting, or dissimilar, inclusions. They are called “additional components” in the map unit descriptions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying layers, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Ashport silt loam, 0 to 1 percent slopes, occasionally flooded, is a phase of the Ashport series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes. A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Darsil-Stephenville-Rock outcrop complex, 3 to 45 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example.

The table "Acreage and Proportionate Extent of the Soils" in Parts I and II of this publication gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

AhpA—Ashport silty clay loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 850 to 1,100 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Ashport and similar soils

Extent of the component in the map unit: 98 percent
Geomorphic setting: Flood plains in valleys
Parent material: Fine-silty alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 11.7 inches
Depth to a water table: More than 6 feet
Flooding: Occasional

Interpretive groups:
Land capability classification (nonirrigated)—2w
Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
Ap—0 to 5 inches; silty clay loam
A—5 to 14 inches; silty clay loam
Bw—14 to 36 inches; silty clay loam
Bb—36 to 96 inches; silty clay loam

Location of representative profile: About 350 feet east and 75 feet north of the southwest corner of sec. 12, T. 14 N., R. 4 W.

Additional Components

- Pulaski and similar soils: 2 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

AmbE—Amber very fine sandy loam, 5 to 15 percent slopes, rarely flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 850 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Amber and similar soils

Extent of the component in the map unit: 75 percent
Geomorphic setting: Flood plains in valleys (on escarpments that separate low flood plains, high flood plains, and uplands)
Parent material: Silty alluvium
Slope: 8 to 15 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Well drained
Available water capacity: About 9.8 inches
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
Ap—0 to 9 inches; very fine sandy loam
A—9 to 11 inches; very fine sandy loam
Bw—11 to 22 inches; very fine sandy loam
C1—22 to 38 inches; stratified very fine sandy loam to silt loam
C2—38 to 84 inches; stratified very fine sandy loam to silty clay loam

Location of representative profile: About 550 feet north

and 50 feet west of the southeast corner of sec. 32, T. 12 N., R. 4 W.

Additional Components

- Keokuk and similar soils: 7 percent
- Asher and similar soils: 6 percent
- Gracemont and similar soils: 6 percent
- Yahola and similar soils: 4 percent
- Watonga and similar soils: 2 percent

Management

Major use: Rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

AshA—Asher silty clay loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Asher and similar soils

Extent of the component in the map unit: 90 percent
Geomorphic setting: Flood plains in valleys
Parent material: Fine-silty alluvium
Slope: 0 to 1 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Drainage class: Moderately well drained
Available water capacity: About 10.7 inches
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
Ap—0 to 8 inches; silty clay loam
A—8 to 14 inches; silty clay loam
Bw—14 to 31 inches; silty clay loam
2C—31 to 88 inches; stratified loamy very fine sand, fine sandy loam, very fine sandy loam, loam, silt loam, and silty clay loam

Location of representative profile: About 280 feet south and 100 feet east of the northwest corner of sec. 33, T. 12 N., R. 2 W.

Additional Components

- Dale and similar soils: 3 percent
- Watonga and similar soils: 3 percent
- Canadian and similar soils: 2 percent
- Hawley soils: 2 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

AspA—Ashport silt loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 850 to 1,100 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Ashport and similar soils

Extent of the component in the map unit: 95 percent
Geomorphic setting: Flood plains in valleys
Parent material: Fine-silty alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 11.8 inches
Depth to a water table: More than 6 feet
Flooding: Occasional

Interpretive groups:
Land capability classification (nonirrigated)—2w

Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
Ap—0 to 7 inches; silt loam
A—7 to 15 inches; silt loam
Bw—15 to 29 inches; silt loam
C—29 to 72 inches; stratified silt loam to very fine sandy loam
Ab—72 to 83 inches; silt loam and very fine sandy loam

Location of representative profile: About 2,280 feet east and 1,040 feet south of the northwest corner of sec. 12, T. 14 N., R. 4 W.

Additional Components

- Miller and similar soils: 3 percent
- Pulaski and similar soils: 2 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

AstA—Ashport silt loam, 0 to 1 percent slopes, frequently flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 800 to 1,100 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Ashport and similar soils

Extent of the component in the map unit: 88 percent
Geomorphic setting: Flood plains in valleys
Parent material: Fine-silty alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 11.8 inches
Depth to a water table: More than 6 feet
Flooding: Frequent

Interpretive groups:
Land capability classification (nonirrigated)—5w
Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
A—0 to 10 inches; silt loam
Bw—10 to 24 inches; silt loam
Ab—24 to 36 inches; silt loam
Bwb1—36 to 48 inches; silt loam
Bwb2—48 to 64 inches; silty clay loam

Location of representative profile: About 1,260 feet south and 2,340 feet west of the northeast corner of sec. 2, T. 13 N., R. 4 W.

Additional Components

- Pulaski and similar soils: 5 percent
- Miller and similar soils: 4 percent
- Easpur and similar soils: 3 percent

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

BetA—Bethany silt loam, 0 to 1 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Bethany and similar soils

Extent of the component in the map unit: 85 percent
Geomorphic setting: Terraces on uplands
Position on landform: Treads
Parent material: Silty and clayey alluvium
Slope: 0 to 1 percent

Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Drainage class: Well drained
Available water capacity: About 10.5 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site number and name—080AY056OK, Loamy Prairie

Typical profile:
Ap—0 to 6 inches; silt loam
A—6 to 14 inches; silt loam
BA—14 to 18 inches; silty clay loam
Bt1—18 to 36 inches; silty clay
Bt2—36 to 56 inches; silty clay
Bt3—56 to 80 inches; silty clay

Location of representative profile: About 1,000 feet north and 100 feet east of the southwest corner of sec. 28, T. 11 N., R. 4 W.

Additional Components

- Norge and similar soils: 4 percent
- Kirkland and similar soils: 3 percent
- Pawhuska and similar soils: 3 percent
- Doolin and similar soils: 2 percent
- Huska and similar soils: 2 percent
- Piedmont and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

BetB—Bethany silt loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Bethany and similar soils

Extent of the component in the map unit: 85 percent
Geomorphic setting: Terraces on uplands
Position on landform: Treads and risers
Parent material: Silty and clayey alluvium
Slope: 1 to 3 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Drainage class: Well drained
Available water capacity: About 10.5 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—080AY056OK, Loamy Prairie

Typical profile:
Ap—0 to 6 inches; silt loam
A—6 to 13 inches; silt loam
BA—13 to 19 inches; silty clay loam
Bt—19 to 32 inches; silty clay
Btk—32 to 59 inches; silty clay
Btb—59 to 84 inches; silty clay loam

Location of representative profile: About 800 feet south and 140 feet west of the northeast corner of sec. 16, T. 14 N., R. 4 W.

Additional Components

- Kirkland and similar soils: 5 percent
- Renfrow and similar soils: 5 percent
- Norge and similar soils: 2 percent
- Huska and similar soils: 1 percent
- Pawhuska and similar soils: 1 percent
- Piedmont and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section

- “Engineering” and “Soil Properties” sections

BeUB—Bethany-Urban land complex, 0 to 3 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Bethany and similar soils

Extent of the component in the map unit: 54 percent
Geomorphic setting: Terraces on uplands
Position on landform: Treads and risers
Parent material: Silty and clayey alluvium
Slope: 1 to 3 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Drainage class: Well drained
Available water capacity: About 10.5 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site—not assigned

Typical profile:
A—0 to 12 inches; silt loam
BA—12 to 16 inches; silty clay loam
Bt1—16 to 28 inches; silty clay
Bt2—28 to 55 inches; silty clay
Bt3—55 to 84 inches; silty clay

Location of representative profile: About 2,480 feet west and 2,000 feet north of the southeast corner of sec. 21, T. 13 N., R. 3 W.

Urban land

Extent of the component in the map unit: 42 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Terraces on uplands
Position on landform: Treads
Parent material: Silty and clayey earthy fill
Slope: 0 to 3 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 2,490 feet west and 2,350 feet north of the southeast corner of sec. 21, T. 13 N., R. 3 W.

Additional Components

- Doolin and similar soils: 1 percent
- Pawhuska and similar soils: 1 percent
- Renfrow and similar soils: 1 percent
- Vanoss and similar soils: 1 percent

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

CaaA—Canadian fine sandy loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Canadian and similar soils

Extent of the component in the map unit: 89 percent
Geomorphic setting: Flood plains in valleys
Parent material: Coarse-loamy alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately rapid
Drainage class: Well drained
Available water capacity: About 8.4 inches
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
Ap—0 to 8 inches; fine sandy loam
A—8 to 19 inches; fine sandy loam
Bw—19 to 30 inches; fine sandy loam
C—30 to 80 inches; fine sandy loam

Location of representative profile: About 100 feet west and 1,300 feet north of the southeast corner of sec. 21, T. 13 N., R. 1 W.

Additional Components

- Asher and similar soils: 4 percent
- Keokuk and similar soils: 3 percent
- Dale and similar soils: 2 percent
- Goodnight and similar soils: 1 percent
- Hawley and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

CaUB—Canadian-Urban land complex, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Canadian and similar soils

Extent of the component in the map unit: 59 percent
Geomorphic setting: Flood plains in valleys
Parent material: Coarse-loamy alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately rapid
Drainage class: Well drained
Available water capacity: About 8.4 inches
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site—not assigned

Typical profile:
A1—0 to 8 inches; fine sandy loam
A2—8 to 18 inches; fine sandy loam
Bw—18 to 28 inches; fine sandy loam
C1—28 to 43 inches; fine sandy loam
C2—43 to 52 inches; fine sandy loam
C3—52 to 84 inches; loamy fine sand

Location of representative profile: About 2,600 feet north and 830 feet east of the southwest corner of sec. 32, T. 12 N., R. 4 W.

Urban land

Extent of the component in the map unit: 41 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Flood plains in valleys
Parent material: Coarse-loamy earthy fill
Slope: 0 to 1 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 2,400 feet north and 1,000 feet east of the southwest corner of sec. 32, T. 12 N., R. 4 W.

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

CoIC2—Coyle-Ironmound complex, 3 to 5 percent slopes, eroded

Map Unit Setting

Major land resource area: 80A
Elevation: 1,100 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Coyle and similar soils

Extent of the component in the map unit: 67 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and summits
Parent material: Residuum derived from sandstone
Slope: 3 to 5 percent
Runoff rate: High
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 4.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—080AY856OK, Reseeded Loamy Prairie

Typical profile:
A—0 to 10 inches; loam
BA—10 to 13 inches; loam
Bt1—13 to 24 inches; sandy clay loam
Bt2—24 to 31 inches; fine sandy loam
Cr—31 to 36 inches; weathered bedrock

Location of representative profile: About 2,080 feet north and 2,000 feet east of the southwest corner of sec. 34, T. 14 N., R. 3 W.

Ironmound and similar soils

Extent of the component in the map unit: 24 percent
Geomorphic setting: Hills on uplands
Position on landform: Backslopes
Parent material: Residuum derived from sandstone
Slope: 3 to 5 percent
Runoff rate: Very high
Depth to paralithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 1.7 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—080AY883OK, Reseeded Shallow Prairie

Typical profile:
A—0 to 7 inches; fine sandy loam
Bw—7 to 12 inches; fine sandy loam
Cr—12 to 15 inches; weathered bedrock

Location of representative profile: About 2,150 feet north and 2,000 feet east of the southwest corner of sec. 34, T. 14 N., R. 3 W.

Additional Components

- Rock outcrop: 5 percent
- Zaneis and similar soils: 2 percent
- Kingfisher and similar soils: 1 percent
- Renfrow and similar soils: 1 percent

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

CoUB—Coyle-Urban land complex, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Coyle and similar soils

Extent of the component in the map unit: 55 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and summits
Parent material: Residuum derived from sandstone
Slope: 1 to 3 percent
Runoff rate: High
Depth to paralithic bedrock: 20 to 40 inches

Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 3.7 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site—not assigned

Typical profile:
A—0 to 8 inches; loam
BA—8 to 14 inches; loam
Bt—14 to 22 inches; clay loam
Cr—22 to 30 inches; weathered bedrock

Location of representative profile: About 2,180 feet north and 600 feet west of the southeast corner of sec. 28, T. 14 N., R. 3 W.

Urban land

Extent of the component in the map unit: 40 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and summits
Parent material: Earthy fill weathered from sandstone
Slope: 1 to 3 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 2,100 feet north and 625 feet west of the southeast corner of sec. 28, T. 14 N., R. 3 W.

Additional Components

- Ironmound and similar soils: 5 percent

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

CoyB—Coyle loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Coyle and similar soils

Extent of the component in the map unit: 73 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and summits
Parent material: Residuum derived from sandstone
Slope: 1 to 3 percent
Runoff rate: High
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 4.3 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—080AY056OK, Loamy Prairie

Typical profile:
A—0 to 7 inches; loam
BA—7 to 10 inches; loam
Bt1—10 to 20 inches; clay loam
Bt2—20 to 27 inches; sandy clay loam
Cr—27 to 40 inches; weathered bedrock

Location of representative profile: About 1,340 feet north and 1,500 feet east of the southwest corner of sec. 34, T. 14 N., R. 3 W.

Additional Components

- Ironmound and similar soils: 14 percent
- Zaneis and similar soils: 7 percent
- Huska and similar soils: 3 percent
- Piedmont and similar soils: 3 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section

- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

DalA—Dale silt loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Dale and similar soils

Extent of the component in the map unit: 93 percent
Geomorphic setting: Flood plains in valleys
Parent material: Fine-silty alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 11.9 inches
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
Ap—0 to 8 inches; silt loam
A—8 to 14 inches; silt loam
Bw1—14 to 21 inches; silt loam
Bw2—21 to 27 inches; silt loam
C1—27 to 53 inches; silt loam
C2—53 to 84 inches; stratified fine sandy loam to silt loam

Location of representative profile: About 650 feet south and 500 feet west of the northeast corner of sec. 32, T. 12 N., R. 2 W.

Additional Components

- Canadian and similar soils: 3 percent
- Asher and similar soils: 1 percent
- Brewer and similar soils: 1 percent
- Hawley and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

DAM—Dams

Map Unit Setting

Major land resource area: 80A
Elevation: 800 to 1,350 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Dams

Extent of the component in the map unit: 100 percent
Geomorphic setting: Hills on uplands
Kind of material: Earthy fill weathered from sandstone and shale
Slope: 0 to 45 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 480 feet north and 1,350 feet west of the southeast corner of sec. 22, T. 13 N., R. 4 W.

Management

For information about managing this map unit, see the following sections in Part II of this publication:

- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

DaUA—Dale-Urban land complex, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Dale and similar soils

Extent of the component in the map unit: 51 percent
Geomorphic setting: Flood plains in valleys
Parent material: Fine-silty alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 11.8 inches
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site—not assigned

Typical profile:
Ap—0 to 8 inches; silt loam
A—8 to 22 inches; silt loam
Bw1—22 to 30 inches; silt loam
Bw2—30 to 38 inches; silt loam
C1—38 to 52 inches; silt loam
C2—52 to 84 inches; stratified very fine sandy loam to silt loam

Location of representative profile: About 1,600 feet north and 660 feet west of the southeast corner of sec. 29, T. 12 N., R. 2 W.

Urban land

Extent of the component in the map unit: 38 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Flood plains in valleys
Parent material: Fine-silty earthy fill weathered from sandstone and shale
Slope: 0 to 1 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 1,250 feet north and 950 feet west of the southeast corner of sec. 29, T. 12 N., R. 2 W.

Additional Components

- Asher and similar soils: 11 percent

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

DeDE—Derby-Dougherty complex, 0 to 15 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 1,000 to 1,350 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Derby and similar soils

Extent of the component in the map unit: 65 percent
Geomorphic setting: Dunes on dune fields, which are on sandhills in valleys
Parent material: Sandy eolian material
Slope: 8 to 15 percent
Runoff rate: Very low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Rapid
Drainage class: Somewhat excessively drained
Available water capacity: About 4.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e

Ecological site number and name—084AY018OK, Deep Sand Savannah

Typical profile:
A—0 to 15 inches; loamy fine sand
E—15 to 27 inches; loamy fine sand
E1 and Bt1—27 to 45 inches; loamy fine sand
E2 and Bt2—45 to 61 inches; loamy fine sand
E3 and Bt3—61 to 72 inches; loamy fine sand

Location of representative profile: About 100 feet north and 1,200 feet west of the southeast corner of sec. 20, T. 12 N., R. 4 W.

Dougherty and similar soils

Extent of the component in the map unit: 30 percent
Geomorphic setting: Dunes on dune fields, which are on sandhills in valleys
Parent material: Eolian deposits
Slope: 8 to 15 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 6.5 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—084AY018OK, Deep Sand Savannah

Typical profile:
A—0 to 6 inches; loamy fine sand
E—6 to 24 inches; loamy fine sand
Bt—24 to 41 inches; sandy clay loam
BC—41 to 52 inches; fine sandy loam
C—52 to 66 inches; loamy fine sand

Location of representative profile: About 100 feet north and 1,200 feet west of the southeast corner of sec. 20, T. 12 N., R. 4 W.

Additional Components

- Stephenville and similar soils: 5 percent

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

DerB—Derby loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 1,000 to 1,350 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Derby and similar soils

Extent of the component in the map unit: 87 percent
Geomorphic setting: Dunes on dune fields, which are on sandhills in valleys
Parent material: Sandy eolian material
Slope: 0 to 3 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Rapid
Drainage class: Somewhat excessively drained
Available water capacity: About 4.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3s
Ecological site number and name—084AY018OK, Deep Sand Savannah

Typical profile:
A—0 to 16 inches; loamy fine sand
E1—16 to 28 inches; loamy fine sand
E2—28 to 56 inches; fine sand
E and Bt—56 to 100 inches; stratified fine sand to loamy fine sand

Location of representative profile: About 2,150 feet west of the northeast corner of sec. 8, T. 11 N., R. 1 E.

Additional Components

- Dougherty and similar soils: 8 percent
- Konawa and similar soils: 4 percent
- Slaughterville and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

DerE—Derby loamy fine sand, 8 to 15 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 1,000 to 1,350 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Derby and similar soils

Extent of the component in the map unit: 92 percent
Geomorphic setting: Dunes on dune fields, which are on sandhills in valleys
Parent material: Sandy eolian material
Slope: 8 to 15 percent
Runoff rate: Very low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Rapid
Drainage class: Somewhat excessively drained
Available water capacity: About 4.8 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—084AY018OK, Deep Sand Savannah

Typical profile:
A—0 to 4 inches; loamy fine sand
E1—4 to 17 inches; loamy fine sand
E2—17 to 34 inches; fine sand
E and Bt—34 to 96 inches; stratified fine sand to loamy fine sand

Location of representative profile: About 1,000 feet north and 1,150 feet west of the southeast corner of sec. 11, T. 11 N., R. 1 W.

Additional Components

- Dougherty and similar soils: 4 percent
- Konawa and similar soils: 3 percent
- Slaughterville and similar soils: 1 percent

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

DleA—Dale silty clay loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Dale and similar soils

Extent of the component in the map unit: 100 percent
Geomorphic setting: Flood plains in valleys
Parent material: Fine-silty alluvium
Slope: 0 to 1 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 11.6 inches
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
Ap—0 to 9 inches; silty clay loam
A—9 to 22 inches; silty clay loam
Bw1—22 to 31 inches; silty clay loam
Bw2—31 to 39 inches; silty clay loam
C—39 to 66 inches; silt loam
2Ck—66 to 96 inches; loam

Location of representative profile: About 1,000 feet north and 1,780 feet east of the southwest corner of sec. 32, T. 12 N., R. 2 W.

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

DSRG—Darsil-Stephenville-Rock outcrop complex, 3 to 45 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 1,000 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Darsil and similar soils

Extent of the component in the map unit: 47 percent
Geomorphic setting: Hills on uplands
Position on landform: Backslopes
Parent material: Residuum derived from sandstone
Slope: 20 to 45 percent
Runoff rate: High
Depth to paralithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Excessively drained
Available water capacity: About 0.8 inch
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—7e
Ecological site number and name—084AY089OK, Shallow Savannah

Typical profile:
A—0 to 6 inches; loamy fine sand
AC—6 to 10 inches; loamy fine sand
Cr—10 to 15 inches; weathered bedrock

Location of representative profile: About 2,325 feet south and 175 feet east of the northwest corner of sec. 25, T. 14 N., R. 2 W.

Stephenville and similar soils

Extent of the component in the map unit: 23 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders
Parent material: Residuum derived from sandstone
Slope: 20 to 25 percent
Runoff rate: High
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 6.2 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—7e
Ecological site number and name—084AY076OK, Sandy Savannah (central)

Typical profile:
A—0 to 4 inches; fine sandy loam
E—4 to 5 inches; fine sandy loam
Bt1—5 to 14 inches; fine sandy loam
Bt2—14 to 22 inches; sandy clay loam
Cr—22 to 30 inches; weathered bedrock

Location of representative profile: About 2,260 feet south and 175 feet east of the northwest corner of sec. 25, T. 14 N., R. 2 W.

Rock outcrop

Extent of the component in the map unit: 20 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Kind of rock: Sandstone
Slope: 20 to 45 percent
Runoff rate: Very high
Depth to paralithic bedrock: 0 to 3 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 2,235 feet south and 175 feet east of the northwest corner of sec. 25, T. 14 N., R. 2 W.

Additional Components

- Harrah and similar soils: 10 percent

Management

Major use: Rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

DUDE—Derby-Urban land-Dougherty complex, 0 to 15 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 1,000 to 1,350 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Derby and similar soils

Extent of the component in the map unit: 42 percent
Geomorphic setting: Dunes on dune fields, which are on sandhills in valleys
Parent material: Sandy eolian material
Slope: 8 to 15 percent
Runoff rate: Very low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Rapid
Drainage class: Somewhat excessively drained
Available water capacity: About 4.8 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site—not assigned

Typical profile:
A—0 to 6 inches; loamy fine sand
E1—6 to 23 inches; loamy fine sand
E2—23 to 32 inches; fine sand
E and Bt—32 to 84 inches; stratified fine sand to loamy fine sand

Location of representative profile: About 1,250 feet north and 750 feet west of the southeast corner of sec. 17, T. 12 N., R. 4 W.

Urban land

Extent of the component in the map unit: 39 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Dunes on dune fields, which are on sandhills in valleys
Parent material: Sandy earthy fill
Slope: 0 to 15 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 290 feet north and 875 feet west of the southeast corner of sec. 17, T. 12 N., R. 4 W.

Dougherty and similar soils

Extent of the component in the map unit: 15 percent
Geomorphic setting: Dunes on dune fields, which are on sandhills in valleys
Parent material: Eolian deposits
Slope: 8 to 15 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 6.5 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site—not assigned

Typical profile:
A—0 to 5 inches; loamy fine sand
E—5 to 26 inches; loamy fine sand
Bt1—26 to 45 inches; sandy clay loam
Bt2—45 to 63 inches; fine sandy loam
C—63 to 84 inches; loamy fine sand

Location of representative profile: About 50 feet north and 1,000 feet west of the southeast corner of sec. 17, T. 12 N., R. 4 W.

Additional Components

- Konawa and similar soils: 3 percent
- Teller and similar soils: 1 percent

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section

- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

EasA—Easpur loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 850 to 1,100 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Easpur and similar soils

Extent of the component in the map unit: 83 percent
Geomorphic setting: Flood plains in valleys
Parent material: Fine-loamy alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 9.8 inches
Depth to a water table: More than 6 feet
Flooding: Occasional

Interpretive groups:
Land capability classification (nonirrigated)—2w
Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
A—0 to 10 inches; loam
Bw1—10 to 24 inches; fine sandy loam
Bw2—24 to 28 inches; clay loam
Cw—28 to 60 inches; fine sandy loam and clay loam
Ab—60 to 80 inches; silt loam

Location of representative profile: About 300 feet north and 700 feet east of the southwest corner of sec. 27, T. 14 N., R. 1 W.

Additional Components

- Pulaski and similar soils: 9 percent
- Ashport and similar soils: 3 percent
- Tribbey and similar soils: 3 percent
- Lawrie and similar soils: 2 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

GaGA—Gaddy-Gracemore complex, 0 to 1 percent slopes, frequently flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 900 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Gaddy and similar soils

Extent of the component in the map unit: 60 percent
Geomorphic setting: Flood plains in valleys
Parent material: Sandy alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Rapid
Drainage class: Somewhat excessively drained
Available water capacity: About 4.8 inches
Depth to a water table: More than 6 feet
Flooding: Frequent

Interpretive groups:
Land capability classification (nonirrigated)—5w
Ecological site number and name—080AY068OK, Sandy Bottomland

Typical profile:
A—0 to 7 inches; loamy fine sand
C1—7 to 19 inches; stratified fine sand to clay loam
C2—19 to 79 inches; stratified fine sand to clay loam

Location of representative profile: About 2,400 feet south and 1,900 feet east of the northwest corner of sec. 25, T. 12 N., R. 1 E.

Gracemore and similar soils

Extent of the component in the map unit: 40 percent
Geomorphic setting: Flood plains in valleys

Parent material: Sandy alluvium
Slope: 0 to 1 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately rapid
Drainage class: Somewhat poorly drained
Available water capacity: About 4.3 inches
Water table: Present
Flooding: Frequent

Interpretive groups:
Land capability classification (nonirrigated)—5w
Ecological site number and name—080AY095OK, Subirrigated

Typical profile:
A1—0 to 8 inches; loamy fine sand
A2—8 to 11 inches; loamy fine sand
C1—11 to 30 inches; loamy fine sand
C2—30 to 65 inches; stratified fine sand and loamy fine sand to fine sandy loam
C3—65 to 80 inches; fine sand

Location of representative profile: About 2,560 feet south and 1,900 feet east of the northwest corner of sec. 25, T. 12 N., R. 1 E.

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

GcmA—Gracemont silty clay, 0 to 1 percent slopes, frequently flooded, overwash

Map Unit Setting

Major land resource area: 80A
Elevation: 900 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Gracemont and similar soils

Extent of the component in the map unit: 90 percent
Geomorphic setting: Flood plains in valleys
Parent material: Coarse-loamy alluvium
Slope: 0 to 1 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Somewhat poorly drained
Available water capacity: About 7.7 inches
Water table: Present
Flooding: Frequent
Salinity: Saline within a depth of 30 inches

Interpretive groups:
Land capability classification (nonirrigated)—5w
Ecological site number and name—080AY095OK, Subirrigated

Typical profile:
Ap—0 to 6 inches; silty clay
A—6 to 9 inches; silty clay
C1—9 to 15 inches; loam
C2—15 to 26 inches; fine sandy loam
2C—26 to 79 inches; stratified loamy sand to silt loam

Location of representative profile: About 1,320 feet south and 2,260 feet east of the northwest corner of sec. 15, T. 12 N., R. 2 W.

Additional Components

- Lomill and similar soils: 10 percent

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

GmtA—Gracemont fine sandy loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 900 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Gracemont and similar soils

Extent of the component in the map unit: 86 percent
Geomorphic setting: Flood plains in valleys
Parent material: Coarse-loamy alluvium
Slope: 0 to 1 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Somewhat poorly drained
Available water capacity: About 7.9 inches
Water table: Present
Flooding: Occasional

Interpretive groups:
Land capability classification (nonirrigated)—4w
Ecological site number and name—080AY095OK, Subirrigated

Typical profile:
Ap—0 to 9 inches; fine sandy loam
A—9 to 12 inches; fine sandy loam
C1—12 to 21 inches; fine sandy loam
C2—21 to 36 inches; loam
C3—36 to 79 inches; stratified loamy sand to silt loam

Location of representative profile: About 2,540 feet north and 1,190 feet east of the southwest corner of sec. 15, T. 12 N., R. 2 W.

Additional Components

- Yahola and similar soils: 14 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

GraC—Grainola silty clay loam, 3 to 5 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Grainola and similar soils

Extent of the component in the map unit: 83 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and backslopes
Parent material: Residuum derived from clayey shale
Slope: 3 to 5 percent
Runoff rate: High
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 4.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—080AY010OK, Claypan Prairie (north)

Typical profile:
A—0 to 8 inches; silty clay loam
Bt—8 to 18 inches; silty clay
Btk1—18 to 30 inches; silty clay
Btk2—30 to 39 inches; silty clay
Cr—39 to 45 inches; weathered bedrock

Location of representative profile: About 1,175 feet west of the northeast corner of sec. 5, T. 14 N., R. 1 E.

Additional Components

- Masham and similar soils: 7 percent
- Stephenville and similar soils: 7 percent
- Ironmound and similar soils: 3 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

GrAD—Grainola-Ashport complex, 0 to 8 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Grainola and similar soils

Extent of the component in the map unit: 70 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and backslopes
Parent material: Residuum derived from clayey shale
Slope: 5 to 8 percent
Runoff rate: High
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 4.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—080AY010OK, Claypan Prairie (north)

Typical profile:
A—0 to 4 inches; silty clay loam
BA—4 to 6 inches; clay loam
Btk1—6 to 18 inches; silty clay
Btk2—18 to 34 inches; silty clay
Cr—34 to 40 inches; weathered bedrock

Location of representative profile: About 2,000 feet north and 1,500 feet east of the southwest corner of sec. 34, T. 11 N., R. 4 W.

Ashport and similar soils

Extent of the component in the map unit: 20 percent
Geomorphic setting: Flood plains in valleys
Parent material: Fine-silty alluvium
Slope: 1 to 3 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 11.7 inches
Depth to a water table: More than 6 feet
Flooding: Frequent

Interpretive groups:
Land capability classification (nonirrigated)—5w
Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
A1—0 to 9 inches; silty clay loam
A2—9 to 14 inches; silty clay loam
Bw1—14 to 32 inches; silty clay loam
Bw2—32 to 55 inches; silty clay loam
C—55 to 79 inches; stratified silty clay loam to silt loam

Location of representative profile: About 1,950 feet north and 1,650 feet east of the southwest corner of sec. 34, T. 11 N., R. 4 W.

Additional Components

- Ironmound and similar soils: 10 percent

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

GrHC—Grant-Huska complex, 1 to 5 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Grant and similar soils

Extent of the component in the map unit: 53 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and backslopes
Parent material: Residuum derived from sandstone
Slope: 3 to 5 percent
Runoff rate: Low
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 8.0 inches

Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—080AY056OK, Loamy Prairie

Typical profile:
A—0 to 11 inches; silt loam
BA—11 to 17 inches; silt loam
Bt1—17 to 28 inches; silty clay loam
Bt2—28 to 38 inches; silty clay loam
BC—38 to 45 inches; silty clay loam
Cr—45 to 52 inches; weathered bedrock

Location of representative profile: About 2,500 feet north and 680 feet east of the southwest corner of sec. 36, T. 11 N., R. 3 W.

Huska and similar soils

Extent of the component in the map unit: 28 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and backslopes
Parent material: Residuum derived from sandstone and shale
Slope: 1 to 5 percent
Runoff rate: Very high
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 3.8 inches
Depth to a water table: More than 6 feet
Flooding: None
Salinity: Saline within a depth of 30 inches
Sodicity: Sodic within a depth of 30 inches

Interpretive groups:
Land capability classification (nonirrigated)—4s
Ecological site number and name—080AY091OK, Slickspot

Typical profile:
A—0 to 6 inches; silt loam
Btn1—6 to 12 inches; silty clay
Btn2—12 to 29 inches; silty clay
Btn3—29 to 42 inches; silty clay
Cr—42 to 44 inches; weathered bedrock

Location of representative profile: About 2,380 feet north and 500 feet east of the southwest corner of sec. 36, T. 11 N., R. 3 W.

Additional Components

- Kingfisher and similar soils: 7 percent
- Renthin and similar soils: 5 percent
- Zaneis and similar soils: 3 percent
- Grainola and similar soils: 2 percent
- Renfrow and similar soils: 2 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

GrIE—Grainola-Ironmound complex, 3 to 12 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Grainola and similar soils

Extent of the component in the map unit: 71 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and backslopes
Parent material: Residuum derived from clayey shale
Slope: 3 to 12 percent
Runoff rate: Very high
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 5.0 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—080AY010OK, Claypan Prairie (north)

Typical profile:
Ap—0 to 7 inches; silty clay loam
BA—7 to 12 inches; silty clay
Btk1—12 to 27 inches; silty clay
Btk2—27 to 38 inches; silty clay
Cr—38 to 46 inches; weathered bedrock

Location of representative profile: About 280 feet north

and 740 feet west of the southeast corner of sec. 28, T. 12 N., R. 2 W.

Ironmound and similar soils

Extent of the component in the map unit: 20 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and backslopes
Parent material: Residuum derived from sandstone
Slope: 3 to 12 percent
Runoff rate: Very high
Depth to paralithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 2.2 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—080AY083OK, Shallow Prairie

Typical profile:
Ap—0 to 7 inches; fine sandy loam
Bw—7 to 18 inches; fine sandy loam
Cr—18 to 22 inches; weathered bedrock

Location of representative profile: About 180 feet north and 900 feet west of the southeast corner of sec. 28, T. 12 N., R. 2 W.

Additional Components

- Rock outcrop: 9 percent

Management

Major use: Rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

GrPB2—Grainola-Piedmont complex, 1 to 3 percent slopes, eroded

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Grainola and similar soils

Extent of the component in the map unit: 57 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and backslopes
Parent material: Residuum derived from clayey shale
Slope: 1 to 3 percent
Runoff rate: High
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 4.8 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—080AY810OK, Reseeded Claypan Prairie

Typical profile:
Ap—0 to 4 inches; silt loam
Bt1—4 to 19 inches; silty clay
Bt2—19 to 32 inches; silty clay
Bt3—32 to 39 inches; silty clay
Cr—39 to 45 inches; weathered bedrock

Location of representative profile: About 50 feet north and 40 feet east of the southwest corner of sec. 34, T. 14 N., R. 3 W.

Piedmont and similar soils

Extent of the component in the map unit: 40 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Residuum derived from clayey shale
Slope: 1 to 3 percent
Runoff rate: High
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 4.6 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—080AY810OK, Reseeded Claypan Prairie

Typical profile:
Ap—0 to 7 inches; silt loam
Bt1—7 to 16 inches; silty clay loam
Bt2—16 to 33 inches; silty clay

Cr—33 to 39 inches; weathered bedrock

Location of representative profile: About 50 feet north and 215 feet east of the southwest corner of sec. 34, T. 14 N., R. 3 W.

Additional Components

- Renfrow and similar soils: 3 percent

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

GrPC2—Grainola-Piedmont complex, 3 to 5 percent slopes, eroded

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Grainola and similar soils

Extent of the component in the map unit: 53 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and backslopes
Parent material: Residuum derived from clayey shale
Slope: 3 to 5 percent
Runoff rate: High
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 3.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—080AY810OK, Reseeded Claypan Prairie

Typical profile:
Ap—0 to 4 inches; silty clay loam
Bt1—4 to 12 inches; silty clay
Bt2—12 to 24 inches; silty clay
Cr—24 to 30 inches; weathered bedrock

Location of representative profile: About 2,275 feet south and 1,000 feet west of the northeast corner of sec. 18, T. 14 N., R. 1 E.

Piedmont and similar soils

Extent of the component in the map unit: 31 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders
Parent material: Residuum derived from clayey shale
Slope: 3 to 5 percent
Runoff rate: High
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 3.6 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—080AY810OK, Reseeded Claypan Prairie

Typical profile:
Ap—0 to 7 inches; silty clay loam
Bt—7 to 15 inches; silty clay
Btk—15 to 23 inches; silty clay
Cr—23 to 30 inches; weathered bedrock

Location of representative profile: About 2,350 feet south and 1,120 feet west of the northeast corner of sec. 18, T. 14 N., R. 1 E.

Additional Components

- Masham and similar soils: 6 percent
- Huska and similar soils: 3 percent
- Ironmound and similar soils: 3 percent
- Coyle and similar soils: 2 percent
- Rock outcrop: 2 percent

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

GUIE—Grainola-Urban land-Ironmound complex, 3 to 12 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Grainola and similar soils

Extent of the component in the map unit: 46 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders
Parent material: Residuum derived from clayey shale
Slope: 5 to 12 percent
Runoff rate: Very high
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 4.6 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site—not assigned

Typical profile:
Ap—0 to 4 inches; silty clay loam
Btk1—4 to 16 inches; silty clay
Btk2—16 to 28 inches; silty clay
Cr—28 to 36 inches; weathered bedrock

Location of representative profile: About 1,370 feet south and 400 feet west of the northeast corner of sec. 14, T. 13 N., R. 4 W.

Urban land

Extent of the component in the map unit: 42 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Hills on uplands
Position on landform: Shoulders
Parent material: Earthy fill weathered from clayey shale or clay residuum
Slope: 3 to 12 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 1,650 feet south and 775 feet west of the northeast corner of sec. 14, T. 13 N., R. 4 W.

Ironmound and similar soils

Extent of the component in the map unit: 12 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and backslopes
Parent material: Residuum derived from sandstone
Slope: 5 to 12 percent
Runoff rate: Very high
Depth to paralithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 2.0 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site—not assigned

Typical profile:
Ap—0 to 5 inches; loam
Bw—5 to 12 inches; loam
Cr—12 to 18 inches; weathered bedrock

Location of representative profile: About 1,520 feet south and 600 feet west of the northeast corner of sec. 14, T. 13 N., R. 4 W.

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

HarC—Harrah fine sandy loam, 3 to 5 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 850 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Harrah and similar soils

Extent of the component in the map unit: 82 percent
Geomorphic setting: Hills on uplands
Position on landform: Footslopes
Parent material: Fine-loamy colluvium derived from sandstone
Slope: 3 to 5 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 7.8 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—084AY076OK, Sandy Savannah (central)

Typical profile:
A—0 to 6 inches; fine sandy loam
E1—6 to 13 inches; fine sandy loam
E2—13 to 19 inches; loamy fine sand
Bt1—19 to 33 inches; sandy clay loam
Bt2—33 to 44 inches; sandy clay loam
Btb—44 to 84 inches; sandy clay loam

Location of representative profile: About 2,350 feet south and 660 feet east of the northwest corner of sec. 25, T. 12 N., R. 1 W.

Additional Components

- Stephenville and similar soils: 8 percent
- Littleaxe and similar soils: 3 percent
- Pulaski and similar soils: 3 percent
- Tribbey and similar soils: 2 percent
- Derby and similar soils: 1 percent
- Newalla and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

HarC2—Harrah fine sandy loam, 3 to 5 percent slopes, eroded

Map Unit Setting

Major land resource area: 84A
Elevation: 850 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Harrah and similar soils

Extent of the component in the map unit: 83 percent
Geomorphic setting: Hills on uplands
Position on landform: Footslopes
Parent material: Fine-loamy colluvium derived from sandstone
Slope: 3 to 5 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 8.2 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—084AY876OK, Reseeded Sandy Savannah

Typical profile:
Ap—0 to 6 inches; fine sandy loam
Bt1—6 to 15 inches; sandy clay loam
Bt2—15 to 27 inches; sandy clay loam
Bt3—27 to 37 inches; sandy clay loam
Bt4—37 to 47 inches; sandy clay loam
Btb—47 to 76 inches; sandy clay loam

Location of representative profile: About 1,950 feet south and 1,850 feet east of the northwest corner of sec. 26, T. 12 N., R. 1 W.

Additional Components

- Littleaxe and similar soils: 11 percent
- Pulaski and similar soils: 2 percent
- Stephenville and similar soils: 2 percent
- Grainola and similar soils: 1 percent
- Newalla and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

HarC4—Harrah fine sandy loam, 3 to 5 percent slopes, gullied

Map Unit Setting

Major land resource area: 84A
Elevation: 850 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Harrah and similar soils

Extent of the component in the map unit: 73 percent
Landscape feature: Deep, uncrossable gullies that have cut into the subsoil of the Harrah soil
Geomorphic setting: Hills on uplands
Position on landform: Footslopes
Parent material: Fine-loamy colluvium derived from sandstone
Slope: 3 to 5 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 8.1 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—084AY876OK, Reseeded Sandy Savannah

Typical profile:
Ap—0 to 5 inches; fine sandy loam
Et—5 to 8 inches; fine sandy loam
Bt1—8 to 11 inches; sandy clay loam
Bt2—11 to 38 inches; sandy clay loam
Btb—38 to 65 inches; sandy clay loam
BCb—65 to 80 inches; sandy clay loam

Location of representative profile: About 1,000 feet north and 300 feet west of the southeast corner of sec. 36, T. 11 N., R. 2 W.

Additional Components

- Gullied land: 10 percent
- Stephenville and similar soils: 9 percent
- Littleaxe and similar soils: 3 percent
- Newalla and similar soils: 3 percent
- Grainola and similar soils: 1 percent
- Pulaski and similar soils: 1 percent

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

HarG—Harrah fine sandy loam, 3 to 45 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 850 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Harrah and similar soils

Extent of the component in the map unit: 80 percent
Geomorphic setting: Drainageways on uplands
Position on landform: Backslopes and footslopes
Parent material: Fine-loamy colluvium derived from sandstone and shale
Slope: 15 to 45 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 8.0 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—7e
Ecological site number and name—084AY076OK, Sandy Savannah (central)

Typical profile:
A—0 to 8 inches; fine sandy loam

E—8 to 13 inches; fine sandy loam
Bt1—13 to 25 inches; sandy clay loam
Bt2—25 to 35 inches; sandy clay loam
Bt3—35 to 43 inches; sandy clay loam
Btb—43 to 84 inches; sandy clay loam

Location of representative profile: About 1,400 feet south and 1,380 feet east of the northwest corner of sec. 35, T. 12 N., R. 1 E.

Additional Components

- Stephenville and similar soils: 8 percent
- Tribbey and similar soils: 7 percent
- Darsil and similar soils: 2 percent
- Littleaxe and similar soils: 1 percent
- Newalla and similar soils: 1 percent
- Pulaski and similar soils: 1 percent

Management

Major use: Rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

HaUC—Harrah-Urban land complex, 3 to 5 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 850 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Harrah and similar soils

Extent of the component in the map unit: 50 percent
Geomorphic setting: Hills on uplands
Position on landform: Footslopes and toeslopes
Parent material: Fine-loamy colluvium derived from sandstone
Slope: 3 to 5 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 8.1 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site—not assigned

Typical profile:
Ap—0 to 6 inches; fine sandy loam
E—6 to 8 inches; fine sandy loam
Bt1—8 to 18 inches; sandy clay loam
Bt2—18 to 37 inches; sandy clay loam
Bt3—37 to 52 inches; sandy clay loam
Btb—52 to 84 inches; sandy clay loam

Location of representative profile: About 1,600 feet south and 1,870 feet east of the northwest corner of sec. 29, T. 12 N., R. 1 E.

Urban land

Extent of the component in the map unit: 45 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Hills on uplands
Position on landform: Footslopes and toeslopes
Parent material: Fine-loamy earthy fill weathered from sandstone
Slope: 3 to 5 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 1,550 feet south and 2,050 feet east of the northwest corner of sec. 29, T. 12 N., R. 1 E.

Additional Components

- Stephenville and similar soils: 5 percent

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

HiLA—Hibsaw-Lomill complex, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 850 to 1,100 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Hibsaw and similar soils

Extent of the component in the map unit: 81 percent
Geomorphic setting: Flood plains in valleys
Parent material: Clayey alluvium
Slope: 0 to 1 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Drainage class: Very poorly drained
Available water capacity: About 8.5 inches
Water table: Present
Flooding: Occasional
Salinity: Saline within a depth of 30 inches
Sodicity: Sodic within a depth of 30 inches

Interpretive groups:
Land capability classification (nonirrigated)—6s
Ecological site number and name—080AY091OK, Slickspot

Typical profile:
Ap—0 to 8 inches; loam
Bw—8 to 18 inches; silt loam
Ck1—18 to 30 inches; silty clay loam
Ck2—30 to 74 inches; stratified loamy fine sand to silty clay
Ab—74 to 96 inches; silt loam

Location of representative profile: About 600 feet south and 150 feet west of the northeast corner of sec. 14, T. 14 N., R. 1 E.

Lomill and similar soils

Extent of the component in the map unit: 14 percent
Geomorphic setting: Flood plains in valleys
Parent material: Clayey alluvium
Slope: 0 to 1 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Somewhat poorly drained
Available water capacity: About 8.4 inches
Water table: Present
Flooding: Occasional

Interpretive groups:
Land capability classification (nonirrigated)—3w
Land capability classification (irrigated)—2w
Ecological site number and name—080AY045OK, Heavy Bottomland

Typical profile:
Ap—0 to 7 inches; silty clay loam
Bw—7 to 25 inches; silty clay loam
C1—25 to 31 inches; silty clay
C2—31 to 84 inches; stratified loamy fine sand to silty clay

Location of representative profile: About 1,600 feet south and 150 feet west of the northeast corner of sec. 14, T. 14 N., R. 1 E.

Additional Components

- Miller and similar soils: 3 percent
- Tribbey and similar soils: 2 percent

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

IrCE—Ironmound-Coyle complex, 5 to 15 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Ironmound and similar soils

Extent of the component in the map unit: 67 percent
Geomorphic setting: Hills on uplands
Position on landform: Backslopes
Parent material: Residuum derived from sandstone
Slope: 5 to 15 percent
Runoff rate: Very high
Depth to paralithic bedrock: 10 to 20 inches

Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 2.0 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—080AY083OK, Shallow Prairie

Typical profile:
A—0 to 8 inches; fine sandy loam
Bw—8 to 14 inches; fine sandy loam
Cr—14 to 20 inches; weathered bedrock

Location of representative profile: About 2,090 feet north and 900 feet east of the southwest corner of sec. 34, T. 14 N., R. 3 W.

Coyle and similar soils

Extent of the component in the map unit: 30 percent
Geomorphic setting: Hills on uplands
Position on landform: Backslopes
Parent material: Residuum derived from sandstone
Slope: 8 to 12 percent
Runoff rate: High
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 4.4 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—080AY056OK, Loamy Prairie

Typical profile:
A—0 to 9 inches; loam
BA—9 to 12 inches; loam
Bt1—12 to 23 inches; sandy clay loam
Bt2—23 to 27 inches; fine sandy loam
Cr—27 to 30 inches; weathered bedrock

Location of representative profile: About 2,080 feet north and 900 feet east of the southwest corner of sec. 34, T. 14 N., R. 3 W.

Additional Components

- Rock outcrop: 3 percent

Management

Major use: Rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

IrKD—Ironmound-Kingfisher complex, 1 to 8 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Ironmound and similar soils

Extent of the component in the map unit: 61 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and backslopes
Parent material: Residuum derived from sandstone
Slope: 5 to 8 percent
Runoff rate: Very high
Depth to paralithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 2.1 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—080AY083OK, Shallow Prairie

Typical profile:
A—0 to 3 inches; loam
Bw—3 to 13 inches; loam
Cr—13 to 21 inches; weathered bedrock

Location of representative profile: About 175 feet south and 1,325 feet west of the northeast corner of sec. 6, T. 13 N., R. 4 W.

Kingfisher and similar soils

Extent of the component in the map unit: 26 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and backslopes
Parent material: Residuum derived from siltstone

Slope: 5 to 8 percent
Runoff rate: High
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 5.7 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—080AY056OK, Loamy Prairie

Typical profile:
A—0 to 10 inches; silt loam
Bt1—10 to 21 inches; silty clay loam
Bt2—21 to 38 inches; silty clay loam
Cr—38 to 49 inches; weathered bedrock

Location of representative profile: About 275 feet south and 1,450 feet west of the northeast corner of sec. 6., T. 13 N., R. 4 W.

Additional Components

- Rock outcrop: 7 percent
- Masham and similar soils: 6 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

KekA—Keokuk very fine sandy loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 900 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Keokuk and similar soils

Extent of the component in the map unit: 100 percent
Geomorphic setting: Flood plains in valleys
Parent material: Coarse-silty alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 9.4 inches
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
Ap—0 to 8 inches; very fine sandy loam
A—8 to 12 inches; very fine sandy loam
Bw—12 to 20 inches; loam
C—20 to 84 inches; stratified loamy very fine sand to silt loam

Location of representative profile: About 1,000 feet south and 1,420 feet east of the northwest corner of sec. 11, T. 12 N., R. 2 W.

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

KeoA—Keokuk very fine sandy loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 850 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Keokuk and similar soils

Extent of the component in the map unit: 90 percent
Geomorphic setting: Flood plains in valleys
Parent material: Coarse-silty alluvium
Slope: 0 to 1 percent

Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 9.6 inches
Depth to a water table: More than 6 feet
Flooding: Occasional

Interpretive groups:
Land capability classification (nonirrigated)—2w
Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
A—0 to 11 inches; very fine sandy loam
Bw—11 to 25 inches; very fine sandy loam
Cb—25 to 96 inches; stratified loamy very fine sand to silt loam

Location of representative profile: About 100 feet south and 150 feet west of the northeast corner of sec. 20, T. 13 N., R. 1 W.

Additional Components

- Asher and similar soils: 10 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

KeUA—Keokuk-Urban land complex, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 900 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Keokuk and similar soils

Extent of the component in the map unit: 53 percent
Geomorphic setting: Flood plains in valleys
Parent material: Coarse-silty alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 10.2 inches
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site—not assigned

Typical profile:
A—0 to 16 inches; very fine sandy loam
Bw—16 to 42 inches; very fine sandy loam
C—42 to 80 inches; stratified loamy very fine sand to silt loam

Location of representative profile: About 2,450 feet north and 550 feet west of the southeast corner of sec. 8, T. 11 N., R. 3 W.

Urban land

Extent of the component in the map unit: 47 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Flood plains in valleys
Parent material: Coarse-silty mine spoil or earthy fill
Slope: 0 to 1 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 2,400 feet north and 925 feet west of the southeast corner of sec. 8, T. 11 N., R. 3 W.

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section

- “Engineering” and “Soil Properties” sections

KgIC—Kingfisher-Ironmound complex, 1 to 5 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Kingfisher and similar soils

Extent of the component in the map unit: 60 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Residuum derived from siltstone
Slope: 3 to 5 percent
Runoff rate: High
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 4.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—080AY056OK, Loamy Prairie

Typical profile:
A—0 to 11 inches; silt loam
BA—11 to 13 inches; silt loam
Bt—13 to 25 inches; silty clay loam
Cr—25 to 28 inches; weathered bedrock

Location of representative profile: About 2,520 feet south and 1,620 feet west of the northeast corner of sec. 36, T. 11 N., R. 3 W.

Ironmound and similar soils

Extent of the component in the map unit: 33 percent
Geomorphic setting: Hills on uplands
Position on landform: Backslopes
Parent material: Residuum derived from sandstone
Slope: 1 to 5 percent
Runoff rate: Very high
Depth to paralithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 2.4 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3s
Ecological site number and name—080AY083OK, Shallow Prairie

Typical profile:
A—0 to 6 inches; loam
Bw—6 to 14 inches; loam
Cr—14 to 18 inches; weathered bedrock

Location of representative profile: About 2,400 feet south and 2,000 feet west of the northeast corner of sec. 36, T. 11 N., R. 3 W.

Additional Components

- Piedmont and similar soils: 4 percent
- Rock outcrop: 3 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

KowB—Konawa fine sandy loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Konawa and similar soils

Extent of the component in the map unit: 97 percent
Geomorphic setting: Terraces on uplands
Position on landform: Treads
Parent material: Fine-loamy eolian deposits derived from sandstone and shale
Slope: 1 to 3 percent
Runoff rate: Low

Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 8.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—084AY076OK, Sandy Savannah (central)

Typical profile:
A—0 to 5 inches; fine sandy loam
E—5 to 17 inches; fine sandy loam
Bt1—17 to 34 inches; sandy clay loam
Bt2—34 to 58 inches; sandy clay loam
C—58 to 84 inches; fine sandy loam

Location of representative profile: About 100 feet south and 1,800 feet west of the northeast corner of sec. 1, T. 12 N., R. 2 W.

Additional Components

- Derby and similar soils: 2 percent
- Navina and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

KowD—Konawa fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Konawa and similar soils

Extent of the component in the map unit: 100 percent
Geomorphic setting: Terraces on uplands
Position on landform: Treads and risers
Parent material: Fine-loamy eolian deposits derived from sandstone and shale
Slope: 5 to 8 percent
Runoff rate: Moderate
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 9.1 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—084AY076OK, Sandy Savannah (central)

Typical profile:
A—0 to 8 inches; fine sandy loam
E—8 to 11 inches; loamy fine sand
Bt1—11 to 28 inches; sandy clay loam
Bt2—28 to 38 inches; sandy clay loam
Bt3—38 to 52 inches; sandy clay loam
BC—52 to 80 inches; fine sandy loam

Location of representative profile: About 675 feet north and 2,400 feet west of the southeast corner of sec. 1, T. 14 N., R. 1 E.

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

KowD2—Konawa fine sandy loam, 3 to 8 percent slopes, eroded

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Konawa and similar soils

Extent of the component in the map unit: 95 percent

Geomorphic setting: Terraces on uplands
Position on landform: Treads and risers
Parent material: Fine-loamy eolian deposits derived from sandstone and shale
Slope: 5 to 8 percent
Runoff rate: Moderate
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 8.8 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—084AY876OK, Reseeded Sandy Savannah

Typical profile:
A—0 to 7 inches; fine sandy loam
Bt1—7 to 18 inches; sandy clay loam
Bt2—18 to 37 inches; sandy clay loam
BC—37 to 80 inches; fine sandy loam

Location of representative profile: About 100 feet south and 700 feet west of the northeast corner of sec. 12, T. 14 N., R. 1 E.

Additional Components

- Lovedale and similar soils: 3 percent
- Derby and similar soils: 2 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

KowD4—Konawa fine sandy loam, 3 to 8 percent slopes, gullied

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Konawa and similar soils

Extent of the component in the map unit: 97 percent
Landscape feature: Deep, uncrossable gullies that have cut into the subsoil of the Konawa soil
Geomorphic setting: Terraces on uplands
Position on landform: Treads and risers
Parent material: Fine-loamy eolian deposits derived from sandstone and shale
Slope: 5 to 8 percent
Runoff rate: Moderate
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 9.3 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—084AY876OK, Reseeded Sandy Savannah

Typical profile:
A—0 to 10 inches; fine sandy loam
E—10 to 13 inches; loamy fine sand
Bt1—13 to 35 inches; sandy clay loam
Bt2—35 to 53 inches; sandy clay loam
Bt3—53 to 65 inches; sandy clay loam
BC—65 to 80 inches; fine sandy loam

Location of representative profile: About 1,550 feet south and 1,500 feet west of the northeast corner of sec. 15, T. 12 N., R. 1 W.

Additional Components

- Lovedale and similar soils: 3 percent

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

KrdA—Kirkland silt loam, 0 to 1 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,350 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Kirkland and similar soils

Extent of the component in the map unit: 95 percent
Geomorphic setting: Terraces on uplands
Position on landform: Treads
Parent material: Clayey alluvium
Slope: 0 to 1 percent
Runoff rate: High
Depth to paralithic bedrock: 60 to 99 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Well drained
Available water capacity: About 7.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—2s
Ecological site number and name—080AY010OK, Claypan Prairie (north)

Typical profile:
A—0 to 10 inches; silt loam
Bt1—10 to 22 inches; silty clay
Bt2—22 to 37 inches; silty clay
Btk1—37 to 63 inches; silty clay
Btk2—63 to 82 inches; clay loam

Location of representative profile: About 1,750 feet north and 360 feet east of the southwest corner of sec. 15, T. 14 N., R. 4 W.

Additional Components

- Pawhuska and similar soils: 5 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

KrUA—Kirkland-Urban land complex, 0 to 1 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,350 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Kirkland and similar soils

Extent of the component in the map unit: 53 percent
Geomorphic setting: Terraces on uplands
Position on landform: Treads
Parent material: Clayey alluvium
Slope: 0 to 1 percent
Runoff rate: High
Depth to paralithic bedrock: 60 to 99 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 8.6 inches
Depth to a water table: More than 6 feet
Flooding: None
Sodicity: Sodic within a depth of 30 inches

Interpretive groups:
Land capability classification (nonirrigated)—2s
Ecological site—not assigned

Typical profile:
Ap—0 to 11 inches; silt loam
Bt—11 to 28 inches; silty clay
Btk—28 to 48 inches; silty clay
2Btk—48 to 76 inches; silty clay
2Cr—76 to 84 inches; weathered bedrock

Location of representative profile: About 2,400 feet south and 2,350 feet west of the northeast corner of sec. 1, T. 12 N., R. 4 W.

Urban land

Extent of the component in the map unit: 47 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Terraces on uplands
Position on landform: Treads
Parent material: Clayey mine spoil or earthy fill
Slope: 0 to 1 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet

Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 2,450 feet south and 2,675 feet west of the northeast corner of sec. 1, T. 12 N., R. 4 W.

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

KUIC—Kingfisher-Urban land-Ironmound complex, 1 to 5 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Kingfisher and similar soils

Extent of the component in the map unit: 45 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Residuum derived from siltstone
Slope: 3 to 5 percent
Runoff rate: High
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 4.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site—not assigned

Typical profile:
A—0 to 11 inches; silt loam
BA—11 to 13 inches; silt loam
Bt—13 to 25 inches; silty clay loam
Cr—25 to 28 inches; weathered bedrock

Location of representative profile: About 2,000 feet south and 320 feet west of the northeast corner of sec. 30, T. 12 N., R. 2 W.

Urban land

Extent of the component in the map unit: 33 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Loamy mine spoil or earthy fill
Slope: 1 to 5 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 1,850 feet south of the northeast corner of sec. 30, T. 12 N., R. 2 W.

Ironmound and similar soils

Extent of the component in the map unit: 18 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Residuum derived from sandstone
Slope: 1 to 5 percent
Runoff rate: Very high
Depth to paralithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 2.4 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3s
Ecological site—not assigned

Typical profile:
A—0 to 6 inches; loam
Bw—6 to 14 inches; loam
Cr—14 to 18 inches; weathered bedrock

Location of representative profile: About 1,975 feet south and 100 feet west of the northeast corner of sec. 30, T. 12 N., R. 2 W.

Additional Components

- Grainola and similar soils: 2 percent

- Grant and similar soils: 1 percent
- Renfrow and similar soils: 1 percent

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

KwUD—Konawa-Urban land complex, 1 to 8 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Konawa and similar soils

Extent of the component in the map unit: 66 percent
Geomorphic setting: Terraces on uplands
Position on landform: Treads and risers
Parent material: Loamy sandstone residuum and eolian deposits
Slope: 5 to 8 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 9.0 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site—not assigned

Typical profile:
A—0 to 7 inches; fine sandy loam
E—7 to 10 inches; fine sandy loam
Bt1—10 to 25 inches; sandy clay loam
Bt2—25 to 49 inches; sandy clay loam
BC—49 to 80 inches; fine sandy loam

Location of representative profile: About 1,900 feet south and 1,100 feet east of the northwest corner of sec. 28, T. 12 N., R. 4 W.

Urban land

Extent of the component in the map unit: 34 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Terraces on uplands
Position on landform: Treads and risers
Parent material: Loamy mine spoil or earthy fill
Slope: 1 to 8 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 1,050 feet south and 1,450 feet east of the northwest corner of sec. 28, T. 12 N., R. 4 W.

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

LarA—Lawrie silt loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 850 to 1,100 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Lawrie and similar soils

Extent of the component in the map unit: 83 percent
Geomorphic setting: Flood plains in valleys
Parent material: Fine-silty alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate

Drainage class: Well drained
Available water capacity: About 11.8 inches
Depth to a water table: More than 6 feet
Flooding: Occasional

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
Ap—0 to 9 inches; silt loam
A—9 to 24 inches; silt loam
Bt1—24 to 40 inches; silty clay loam
Bt2—40 to 67 inches; silty clay loam
Bt3—67 to 87 inches; silty clay loam

Location of representative profile: About 1,450 feet south and 100 feet west of the northeast corner of sec. 30, T. 14 N., R. 1 W.

Additional Components

- Pulaski and similar soils: 8 percent
- Miller and similar soils: 6 percent
- Yahola and similar soils: 3 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

LatG—Latrass loam, 1 to 45 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 850 to 1,600 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Latrass and similar soils

Extent of the component in the map unit: 100 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and shoulders
Parent material: Mine spoil or earthy fill
Slope: 15 to 45 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Well drained
Available water capacity: About 6.1 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Typical profile:
A—0 to 5 inches; loam
C1—5 to 22 inches; clay loam
C2—22 to 42 inches; clay
Cd—42 to 80 inches; various textures

Location of representative profile: About 2,500 feet north and 325 feet west of the southeast corner of sec. 25, T. 11 N., R. 3 W.

Management

Major use: Refuse disposal

For information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

LawA—Lawrie loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 900 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Lawrie and similar soils

Extent of the component in the map unit: 80 percent
Geomorphic setting: Flood plains in valleys
Parent material: Fine-silty alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained

Available water capacity: About 11.8 inches
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
Ap—0 to 9 inches; loam
A—9 to 13 inches; silt loam
BA—13 to 18 inches; silty clay loam
Bt1—18 to 47 inches; silty clay loam
Bt2—47 to 59 inches; silty clay loam
Btk—59 to 82 inches; silty clay loam

Location of representative profile: About 1,050 feet south and 100 feet east of the northwest corner of sec. 22, T. 13 N., R. 4 W.

Additional Components

- Ashport and similar soils: 10 percent
- Canadian and similar soils: 5 percent
- Easpur and similar soils: 5 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

LitB—Littleaxe fine sandy loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Littleaxe and similar soils

Extent of the component in the map unit: 83 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits
Parent material: Residuum derived from sandstone
Slope: 1 to 3 percent
Runoff rate: Low
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 5.8 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—084AY076OK, Sandy Savannah (central)

Typical profile:
A—0 to 5 inches; fine sandy loam
E—5 to 9 inches; fine sandy loam
Bt1—9 to 17 inches; sandy clay loam
Bt2—17 to 36 inches; sandy clay loam
BC—36 to 43 inches; sandy clay loam
Cr—43 to 45 inches; weathered bedrock

Location of representative profile: About 1,450 feet south and 1,600 feet west of the northeast corner of sec. 32, T. 12 N., R. 1 E.

Additional Components

- Stephenville and similar soils: 10 percent
- Newalla and similar soils: 7 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

LitC—Littleaxe fine sandy loam, 3 to 5 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Littleaxe and similar soils

Extent of the component in the map unit: 80 percent

Geomorphic setting: Hills on uplands
Position on landform: Shoulders
Parent material: Residuum derived from sandstone
Slope: 3 to 5 percent
Runoff rate: Low
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 6.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—084AY076OK, Sandy Savannah (central)

Typical profile:
A—0 to 6 inches; fine sandy loam
E—6 to 8 inches; fine sandy loam
Bt1—8 to 33 inches; sandy clay loam
Bt2—33 to 52 inches; sandy clay loam
BC—52 to 59 inches; sandy clay loam
Cr—59 to 72 inches; weathered bedrock

Location of representative profile: About 100 feet north and 100 feet west of the southeast corner of sec. 25, T. 12 N., R. 1 W.

Additional Components

- Newalla and similar soils: 10 percent
- Stephenville and similar soils: 10 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

LitC2—Littleaxe fine sandy loam, 3 to 5 percent slopes, eroded

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Littleaxe and similar soils

Extent of the component in the map unit: 78 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders
Parent material: Residuum derived from sandstone
Slope: 3 to 5 percent
Runoff rate: Low
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 6.2 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—084AY876OK, Reseeded Sandy Savannah

Typical profile:
A—0 to 9 inches; fine sandy loam
Bt1—9 to 21 inches; sandy clay loam
Bt2—21 to 32 inches; sandy clay loam
BC—32 to 45 inches; sandy clay loam
Cr—45 to 50 inches; weathered bedrock

Location of representative profile: About 2,600 feet south and 1,000 feet west of the northeast corner of sec. 26, T. 12 N., R. 1 W.

Additional Components

- Stephenville and similar soils: 12 percent
- Newalla and similar soils: 7 percent
- Darsil and similar soils: 1 percent
- Grainola and similar soils: 1 percent
- Harrah and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

LomA—Lomill silty clay loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 850 to 1,100 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Lomill and similar soils

Extent of the component in the map unit: 90 percent
Geomorphic setting: Flood plains in valleys
Parent material: Clayey alluvium over loamy alluvium
Slope: 0 to 1 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Somewhat poorly drained
Available water capacity: About 8.1 inches
Water table: Present
Flooding: Occasional

Interpretive groups:
Land capability classification (nonirrigated)—3w
Land capability classification (irrigated)—2w
Ecological site number and name—080AY045OK, Heavy Bottomland

Typical profile:
Ap—0 to 4 inches; silty clay loam
A—4 to 12 inches; silty clay
Bw—12 to 27 inches; silty clay
2C1—27 to 48 inches; stratified loamy fine sand to silty clay
2C2—48 to 62 inches; stratified loamy fine sand to silty clay

Location of representative profile: About 650 feet south and 60 feet west of the northeast corner of sec. 12, T. 14 N., R. 1 E.

Additional Components

- Ashport and similar soils: 4 percent
- Asher and similar soils: 3 percent
- Brewless soils: 3 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

LtUC—Littleaxe-Urban land complex, 1 to 5 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Littleaxe and similar soils

Extent of the component in the map unit: 62 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits
Parent material: Residuum derived from sandstone
Slope: 3 to 5 percent
Runoff rate: Low
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 5.4 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site—not assigned

Typical profile:
A—0 to 6 inches; fine sandy loam
E—6 to 11 inches; fine sandy loam
Bt1—11 to 25 inches; sandy clay loam
Bt2—25 to 32 inches; sandy clay loam
BC—32 to 44 inches; sandy clay loam
Cr—44 to 50 inches; weathered bedrock

Location of representative profile: About 550 feet north and 1,650 feet east of the southwest corner of sec. 35, T. 12 N., R. 1 E.

Urban land

Extent of the component in the map unit: 38 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Hills on uplands
Position on landform: Summits
Parent material: Fine-loamy mine spoil or earthy fill

Slope: 1 to 5 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 550 feet north and 1,650 feet east of the southwest corner of sec. 35, T. 12 N., R. 1 E.

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

LweA—Lawrie silty clay loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Lawrie and similar soils

Extent of the component in the map unit: 85 percent
Geomorphic setting: Flood plains in valleys
Parent material: Fine-silty alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 11.8 inches
Depth to a water table: More than 6 feet
Flooding: Occasional

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
Ap—0 to 11 inches; silty clay loam
A—11 to 21 inches; silty clay loam
Bt1—21 to 34 inches; silty clay loam
Bt2—34 to 55 inches; silty clay loam
C—55 to 80 inches; silty clay loam

Location of representative profile: About 850 feet south and 2,180 feet west of the northeast corner of sec. 28, T. 14 N., R. 1 W.

Additional Components

- Ashport and similar soils: 10 percent
- Miller and similar soils: 5 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

LwfA—Lawrie fine sandy loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 850 to 1,100 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Lawrie and similar soils

Extent of the component in the map unit: 80 percent
Geomorphic setting: Flood plains in valleys
Parent material: Fine-silty alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 10.8 inches
Depth to a water table: More than 6 feet

Flooding: Occasional

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
A1—0 to 14 inches; fine sandy loam
A2—14 to 33 inches; silt loam
Bt1—33 to 57 inches; silty clay loam
Bt2—57 to 70 inches; silty clay loam
Btk—70 to 96 inches; silty clay loam

Location of representative profile: About 1,870 feet south and 2,000 feet east of the northwest corner of sec. 24, T. 13 N., R. 3 W.

Additional Components

- Ashport and similar soils: 10 percent
- Pulaski and similar soils: 10 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

LwUA—Lawrie-Urban land complex, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 850 to 1,100 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Lawrie and similar soils

Extent of the component in the map unit: 60 percent
Geomorphic setting: Flood plains in valleys
Parent material: Fine-silty alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 11.7 inches
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site—not assigned

Typical profile:
Ap—0 to 9 inches; silt loam
A—9 to 17 inches; silt loam
BA—17 to 24 inches; silty clay loam
Bt1—24 to 33 inches; silty clay loam
Bt2—33 to 45 inches; silty clay loam
Btk—45 to 84 inches; silty clay loam

Location of representative profile: About 1,150 feet south and 1,500 feet east of the northwest corner of sec. 13, T. 13 N., R. 4 W.

Urban land

Extent of the component in the map unit: 40 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Flood plains in valleys
Parent material: Fine-silty mine spoil or earthy fill
Slope: 0 to 1 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 1,200 feet south and 1,750 feet east of the northwest corner of sec. 13, T. 13 N., R. 4 W.

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

MlfA—Miller fine sandy loam, 0 to 1 percent slopes, occasionally flooded, overwash

Map Unit Setting

Major land resource area: 80A
Elevation: 850 to 1,100 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Miller and similar soils

Extent of the component in the map unit: 90 percent
Geomorphic setting: Flood plains in valleys
Parent material: Clayey alluvium
Slope: 0 to 1 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Moderately well drained
Available water capacity: About 9.3 inches
Depth to a water table: More than 6 feet
Flooding: Occasional

Interpretive groups:
Land capability classification (nonirrigated)—2w
Ecological site number and name—080AY045OK, Heavy Bottomland

Typical profile:
Ap—0 to 19 inches; fine sandy loam
A—19 to 29 inches; silty clay
Bw—29 to 37 inches; silty clay
2Bb—37 to 96 inches; silty clay loam

Location of representative profile: About 1,450 feet south and 2,000 feet west of the northeast corner of sec. 14, T. 14 N., R. 1 E.

Additional Components

- Pulaski and similar soils: 10 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

MlIA—Miller silty clay, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 850 to 1,100 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Miller and similar soils

Extent of the component in the map unit: 90 percent
Geomorphic setting: Flood plains in valleys
Parent material: Clayey alluvium
Slope: 0 to 1 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Moderately well drained
Available water capacity: About 9.3 inches
Depth to a water table: More than 6 feet
Flooding: Occasional

Interpretive groups:
Land capability classification (nonirrigated)—3w
Ecological site number and name—080AY045OK, Heavy Bottomland

Typical profile:
Ap—0 to 7 inches; silty clay
A—7 to 12 inches; silty clay
Bw—12 to 24 inches; silty clay
C1—24 to 70 inches; silty clay
C2—70 to 84 inches; silty clay

Location of representative profile: About 80 feet south and 2,020 feet east of the northwest corner of sec. 12, T. 14 N., R. 1 E.

Additional Components

- Lawrie and similar soils: 5 percent
- Ashport and similar soils: 2 percent
- Easpur and similar soils: 2 percent
- Yahola and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section

- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

M-W—Miscellaneous water

Map Unit Setting

Major land resource area: 80A
Elevation: 800 to 1,350 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Miscellaneous water

Extent of the component in the map unit: 100 percent
Definition of the component: Areas of miscellaneous water, such as sewage lagoons and industrial wastewater
Geomorphic setting: Flood plains in valleys
Ponding: Frequent

Location of a representative area: About 1,150 feet north and 475 feet west of the southeast corner of sec. 2, T. 12 N., R. 2 W.

Management

For information about managing this map unit, see the following sections in Part II of this publication:

- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

NewB—Newalla fine sandy loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Newalla and similar soils

Extent of the component in the map unit: 75 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and backslopes
Parent material: Loamy sandstone residuum over clayey shale residuum
Slope: 1 to 3 percent
Runoff rate: Very high
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 6.2 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3s
Ecological site number and name—084AY076OK, Sandy Savannah (central)

Typical profile:
A—0 to 4 inches; fine sandy loam
E—4 to 8 inches; fine sandy loam
Bt—8 to 16 inches; sandy clay loam
2Bt—16 to 32 inches; silty clay
2BC—32 to 42 inches; very gravelly silty clay
2Cr—42 to 48 inches; weathered bedrock

Location of representative profile: About 2,600 feet south and 1,520 feet east of the northwest corner of sec. 36, T. 11 N., R. 2 W.

Additional Components

- Zaneis and similar soils: 10 percent
- Chickaska and similar soils: 5 percent
- Grainola and similar soils: 4 percent
- Stephenville and similar soils: 3 percent
- Darsil and similar soils: 2 percent
- Harrah and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

NewC2—Newalla fine sandy loam, 3 to 5 percent slopes, eroded

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,250 feet

Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Newalla and similar soils

Extent of the component in the map unit: 85 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and backslopes
Parent material: Loamy sandstone residuum over clayey shale residuum
Slope: 3 to 5 percent
Runoff rate: Very high
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 7.6 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—084AY876OK, Reseeded Sandy Savannah

Typical profile:
A—0 to 6 inches; fine sandy loam
Bt—6 to 10 inches; sandy clay loam
2Bt1—10 to 38 inches; silty clay
2Bt2—38 to 55 inches; silty clay
2Cr—55 to 60 inches; weathered bedrock

Location of representative profile: About 1,950 feet south and 100 feet east of the northwest corner of sec. 36, T. 12 N., R. 1 E.

Additional Components

- Stephenville and similar soils: 10 percent
- Darsil and similar soils: 3 percent
- Grainola and similar soils: 2 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

NorB—Norge silt loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 1,050 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Norge and similar soils

Extent of the component in the map unit: 87 percent
Geomorphic setting: Terraces on uplands
Position on landform: Treads
Parent material: Fine-silty alluvium
Slope: 1 to 3 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 11.4 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—080AY056OK, Loamy Prairie

Typical profile:
Ap—0 to 12 inches; silt loam
BA—12 to 18 inches; silty clay loam
Bt1—18 to 27 inches; silty clay loam
Bt2—27 to 43 inches; silty clay loam
Bt3—43 to 86 inches; silty clay loam

Location of representative profile: About 1,050 feet north and 2,550 feet west of the southeast corner of sec. 6, T. 12 N., R. 4 W.

Additional Components

- Bethany and similar soils: 5 percent
- Renfrow and similar soils: 5 percent
- Teller and similar soils: 2 percent
- Kingfisher and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

NorC—Norge silt loam, 3 to 5 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 1,050 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Norge and similar soils

Extent of the component in the map unit: 85 percent
Geomorphic setting: Terraces on uplands
Position on landform: Treads
Parent material: Fine-silty alluvium
Slope: 3 to 5 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 11.4 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—080AY056OK, Loamy Prairie

Typical profile:
Ap—0 to 9 inches; silt loam
BA—9 to 14 inches; silty clay loam
Bt1—14 to 39 inches; silty clay loam
Bt2—39 to 68 inches; silty clay loam
Bt3—68 to 88 inches; silty clay loam

Location of representative profile: About 500 feet north and 600 feet east of the southwest corner of sec. 21, T. 14 N., R. 4 W.

Additional Components

- Teval and similar soils: 5 percent
- Teller and similar soils: 4 percent
- Renfrow and similar soils: 3 percent
- Grant and similar soils: 1 percent
- Mulhall and similar soils: 1 percent
- Pawhuska and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

NorC2—Norge silt loam, 3 to 5 percent slopes, eroded

Map Unit Setting

Major land resource area: 80A
Elevation: 1,050 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Norge and similar soils

Extent of the component in the map unit: 86 percent
Geomorphic setting: Terraces on uplands
Position on landform: Treads
Parent material: Fine-silty alluvium
Slope: 3 to 5 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 11.3 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—080AY856OK, Reseeded Loamy Prairie

Typical profile:
Ap—0 to 10 inches; silt loam
Bt1—10 to 30 inches; silty clay loam
Bt2—30 to 49 inches; silty clay loam
Bt3—49 to 63 inches; silty clay loam
Bt4—63 to 84 inches; clay loam

Location of representative profile: About 1,800 feet north and 2,000 feet west of the southeast corner of sec. 7, T. 12 N., R. 4 W.

Additional Components

- Renfrow and similar soils: 4 percent
- Teller and similar soils: 4 percent
- Lawrie and similar soils: 3 percent
- Grant and similar soils: 1 percent
- Mulhall and similar soils: 1 percent
- Pawhuska and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

NoUC—Norge-Urban land complex, 1 to 5 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 1,050 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Norge and similar soils

Extent of the component in the map unit: 65 percent
Geomorphic setting: Terraces on uplands
Position on landform: Treads
Parent material: Fine-silty alluvium
Slope: 3 to 5 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 11.7 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site—not assigned

Typical profile:
A—0 to 9 inches; silt loam
BA—9 to 16 inches; silty clay loam
Bt1—16 to 46 inches; silty clay loam
Bt2—46 to 68 inches; silty clay loam
Bt3—68 to 84 inches; silty clay loam

Location of representative profile: About 600 feet south and 580 feet west of the northeast corner of sec. 30, T. 12 N., R. 2 W.

Urban land

Extent of the component in the map unit: 35 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Terraces on uplands
Position on landform: Treads
Parent material: Fine-silty earthy fill weathered from sandstone and shale
Slope: 1 to 5 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 750 feet south of the northeast corner of sec. 30, T. 12 N., R. 2 W.

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

PdHC—Piedmont-Huska complex, 1 to 5 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Piedmont and similar soils

Extent of the component in the map unit: 71 percent

Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Clayey shale residuum
Slope: 1 to 3 percent
Runoff rate: Very high
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 4.6 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—080AY010OK, Claypan Prairie (north)

Typical profile:
Ap—0 to 7 inches; silt loam
BA—7 to 10 inches; silty clay loam
Bt—10 to 15 inches; silty clay
Btk1—15 to 25 inches; silty clay
Btk2—25 to 37 inches; silty clay
Cr—37 to 45 inches; weathered bedrock

Location of representative profile: About 2,150 feet south and 1,750 feet east of the northwest corner of sec. 11, T. 14 N., R. 3 W.

Huska and similar soils

Extent of the component in the map unit: 19 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and backslopes
Parent material: Clayey shale residuum
Slope: 1 to 5 percent
Runoff rate: Very high
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 3.3 inches
Depth to a water table: More than 6 feet
Flooding: None
Salinity: Saline within a depth of 30 inches
Sodicity: Sodic within a depth of 30 inches

Interpretive groups:
Land capability classification (nonirrigated)—4s
Ecological site number and name—080AY091OK, Slickspot

Typical profile:
Ap—0 to 3 inches; silt loam
Bt—3 to 18 inches; silty clay
Btkn—18 to 40 inches; silty clay loam
Cr—40 to 45 inches; weathered bedrock

Location of representative profile: About 2,050 feet south and 1,800 feet east of the northwest corner of sec. 11, T. 14 N., R. 3 W.

Additional Components

- Coyle and similar soils: 7 percent
- Ironmound and similar soils: 3 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

PieC2—Piedmont silty clay loam, 3 to 5 percent slopes, eroded

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Piedmont and similar soils

Extent of the component in the map unit: 85 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Clayey shale residuum
Slope: 3 to 5 percent
Runoff rate: Very high
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 4.7 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—080AY810OK, Reseeded Claypan Prairie

Typical profile:
Ap—0 to 4 inches; silty clay loam
Bt—4 to 20 inches; silty clay
Btk—20 to 32 inches; gravelly silty clay loam

Cr—32 to 40 inches; weathered bedrock

Location of representative profile: About 150 feet south and 1,550 feet west of the northeast corner of sec. 5, T. 14 N., R. 4 W.

Additional Components

- Ironmound and similar soils: 4 percent
- Coyle and similar soils: 3 percent
- Huska and similar soils: 3 percent
- Masham and similar soils: 3 percent
- Mulhall and similar soils: 1 percent
- Renfrow and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

PimB—Piedmont silt loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Piedmont and similar soils

Extent of the component in the map unit: 94 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Clayey shale residuum
Slope: 1 to 3 percent
Runoff rate: Very high
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 4.6 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—080AY010OK, Claypan Prairie (north)

Typical profile:
Ap—0 to 4 inches; silt loam
BA—4 to 8 inches; silty clay loam
Btss—8 to 16 inches; silty clay
Btkss—16 to 30 inches; silty clay
BCk—30 to 36 inches; silty clay
Cr—36 to 48 inches; weathered bedrock

Location of representative profile: About 1,300 feet south and 2,000 feet west of the northeast corner of sec. 9, T. 14 N., R. 4 W.

Additional Components

- Ironmound and similar soils: 3 percent
- Kirkland and similar soils: 3 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

PimC—Piedmont silt loam, 3 to 5 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Piedmont and similar soils

Extent of the component in the map unit: 91 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Clayey shale residuum
Slope: 3 to 5 percent
Runoff rate: Very high
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 4.9 inches

Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—080AY010OK, Claypan Prairie (north)

Typical profile:
Ap—0 to 4 inches; silt loam
BA—4 to 6 inches; silty clay loam
Bt—6 to 23 inches; silty clay
Btk—23 to 31 inches; silty clay
Cr—31 to 40 inches; weathered bedrock

Location of representative profile: About 2,350 feet south and 1,550 feet west of the northeast corner of sec. 9, T. 13 N., R. 4 W.

Additional Components

- Huska and similar soils: 9 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

PIT—Pits

Map Unit Setting

Major land resource area: 80A
Elevation: 800 to 1,350 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Pits

Extent of the component in the map unit: 100 percent
Geomorphic setting: Hills on uplands
Kind of material: Earthy fill weathered from sandstone and shale
Slope: 0 to 4 percent

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 2,500 feet south and 1,800 feet east of the northwest corner of sec. 1, T. 12 N., R. 2 W.

Management

For information about managing this map unit, see the following sections in Part II of this publication:

- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

PukA—Pulaski fine sandy loam, 0 to 1 percent slopes, frequently flooded

Map Unit Setting

Major land resource area: 84A
Elevation: 800 to 1,150 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Pulaski and similar soils

Extent of the component in the map unit: 75 percent
Geomorphic setting: Flood plains in valleys
Parent material: Coarse-loamy alluvium derived from sandstone and shale
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately rapid
Drainage class: Well drained
Available water capacity: About 9.4 inches
Depth to a water table: More than 6 feet
Flooding: Frequent

Interpretive groups:
Land capability classification (nonirrigated)—5w
Ecological site number and name—084AY050OK, Loamy Bottomland

Typical profile:
Ap—0 to 9 inches; fine sandy loam
A—9 to 14 inches; fine sandy loam
C1—14 to 55 inches; fine sandy loam
C2—55 to 79 inches; stratified loamy fine sand to loam

Location of representative profile: About 2,300 feet south and 1,200 feet east of the northwest corner of sec. 16, T. 14 N., R. 2 W.

Additional Components

- Easpur and similar soils: 13 percent

- Ashport and similar soils: 4 percent
- Water: 4 percent
- Tribbey and similar soils: 2 percent
- Harrah and similar soils: 1 percent
- Lawrie and similar soils: 1 percent

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

PulA—Pulaski fine sandy loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 84A
Elevation: 850 to 1,100 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Pulaski and similar soils

Extent of the component in the map unit: 88 percent
Geomorphic setting: Flood plains in valleys
Parent material: Coarse-loamy alluvium derived from sandstone and shale
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately rapid
Drainage class: Well drained
Available water capacity: About 8.9 inches
Depth to a water table: More than 6 feet
Flooding: Occasional

Interpretive groups:
Land capability classification (nonirrigated)—2w
Ecological site number and name—084AY050OK, Loamy Bottomland

Typical profile:
Ap—0 to 5 inches; fine sandy loam
C1—5 to 17 inches; fine sandy loam
C2—17 to 34 inches; fine sandy loam
Cb—34 to 72 inches; stratified loamy fine sand to loam

Location of representative profile: About 100 feet south and 700 feet west of the northeast corner of sec. 9, T. 12 N., R. 2 W.

Additional Components

- Easpur and similar soils: 5 percent
- Tribbey and similar soils: 4 percent
- Lawrie and similar soils: 2 percent
- Ashport and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

RenB—Renfrow silt loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Renfrow and similar soils

Extent of the component in the map unit: 78 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and shoulders
Parent material: Clayey shale residuum
Slope: 1 to 3 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Well drained
Available water capacity: About 10.5 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—080AY010OK, Claypan Prairie (north)

Typical profile:
Ap—0 to 8 inches; silt loam

BA—8 to 15 inches; clay loam
Btss1—15 to 41 inches; silty clay
Btss2—41 to 68 inches; silty clay loam
Btss3—68 to 99 inches; silty clay

Location of representative profile: About 600 feet south and 500 feet east of the northwest corner of sec. 14, T. 14 N., R. 4 W.

Additional Components

- Bethany and similar soils: 6 percent
- Renthin and similar soils: 6 percent
- Zaneis and similar soils: 4 percent
- Kirkland and similar soils: 2 percent
- Norge and similar soils: 2 percent
- Piedmont and similar soils: 2 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

RinB—Renthin silt loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Renthin and similar soils

Extent of the component in the map unit: 96 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Clayey shale residuum
Slope: 1 to 3 percent
Runoff rate: Very high
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 8.3 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—080AY010OK, Claypan Prairie (north)

Typical profile:
Ap—0 to 4 inches; silt loam
BA—4 to 10 inches; clay loam
Bt—10 to 29 inches; clay
Btk—29 to 55 inches; clay
Cr—55 to 77 inches; weathered bedrock

Location of representative profile: About 2,500 feet north and 1,500 feet east of the southwest corner of sec. 26, T. 13 N., R. 3 W.

Additional Components

- Grainola and similar soils: 1 percent
- Huska and similar soils: 1 percent
- Kingfisher and similar soils: 1 percent
- Zaneis and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

RnnB—Renthin silty clay loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Renthin and similar soils

Extent of the component in the map unit: 100 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Clayey shale residuum
Slope: 1 to 3 percent
Runoff rate: Very high
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable

Drainage class: Well drained
Available water capacity: About 7.6 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—080AY010OK, Claypan Prairie (north)

Typical profile:
Ap—0 to 10 inches; silty clay loam
BA—10 to 16 inches; silty clay loam
Bt1—16 to 26 inches; silty clay
Bt2—26 to 34 inches; silty clay
BC—34 to 44 inches; silty clay
Cr—44 to 50 inches; weathered bedrock

Location of representative profile: About 225 feet north and 1,680 feet west of the southeast corner of sec. 6, T. 14 N., R. 4 W.

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

RnnC2—Renthin silty clay loam, 3 to 5 percent slopes, eroded

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Renthin and similar soils

Extent of the component in the map unit: 93 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Clayey shale residuum
Slope: 3 to 5 percent
Runoff rate: Very high
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 8.1 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—080AY810OK, Reseeded Claypan Prairie

Typical profile:
Ap—0 to 8 inches; silty clay loam
BA—8 to 12 inches; silty clay loam
Bt1—12 to 19 inches; silty clay
Bt2—19 to 55 inches; silty clay
Cr—55 to 60 inches; weathered bedrock

Location of representative profile: About 2,520 feet north and 120 feet west of the southeast corner of sec. 35, T. 14 N., R. 4 W.

Additional Components

- Grainola and similar soils: 2 percent
- Coyle and similar soils: 1 percent
- Huska and similar soils: 1 percent
- Kingfisher and similar soils: 1 percent
- Norge and similar soils: 1 percent
- Zaneis and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

RnUC—Renthin-Urban land complex, 1 to 5 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Renthin and similar soils

Extent of the component in the map unit: 55 percent
Geomorphic setting: Hills on uplands

Position on landform: Summits and backslopes
Parent material: Clayey shale residuum
Slope: 3 to 5 percent
Runoff rate: Very high
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 8.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site—not assigned

Typical profile:
A—0 to 10 inches; silt loam
BA—10 to 14 inches; silty clay loam
Bt—14 to 51 inches; silty clay
Btk—51 to 58 inches; silty clay
Cr—58 to 72 inches; weathered bedrock

Location of representative profile: About 2,550 feet north and 2,200 feet east of the southwest corner of sec. 35, T. 11 N., R. 3 W.

Urban land

Extent of the component in the map unit: 45 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Earthy fill weathered from clayey shale or clay residuum
Slope: 1 to 5 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 2,450 feet north and 2,650 feet east of the southwest corner of sec. 35, T. 11 N., R. 3 W.

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

SDGD4—Stephenville-Darsil-Gullied land complex, 3 to 8 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Stephenville and similar soils

Extent of the component in the map unit: 49 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Residuum derived from sandstone
Slope: 5 to 8 percent
Runoff rate: Medium
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 4.8 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—084AY876OK, Reseeded Sandy Savannah

Typical profile:
A—0 to 4 inches; fine sandy loam
Bt1—4 to 20 inches; sandy clay loam
Bt2—20 to 30 inches; sandy clay loam
Cr—30 to 40 inches; weathered bedrock

Location of representative profile: About 2,270 feet north and 2,010 feet east of the southwest corner of sec. 36, T. 11 N., R. 2 W.

Darsil and similar soils

Extent of the component in the map unit: 22 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders
Parent material: Residuum derived from sandstone
Slope: 3 to 8 percent
Runoff rate: High
Depth to paralithic bedrock: 10 to 20 inches

Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Excessively drained
Available water capacity: About 0.8 inch
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—084AY889OK, Reseeded Shallow Savannah

Typical profile:
A—0 to 6 inches; loamy fine sand
AC—6 to 10 inches; loamy fine sand
Cr—10 to 15 inches; weathered bedrock

Location of representative profile: About 1,730 feet north and 2,010 feet east of the southwest corner of sec. 36, T. 11 N., R. 2 W.

Gullied land

Extent of the component in the map unit: 13 percent
Definition of the component: Deep, uncrossable gullies that have cut into the subsoil of the Stephenville and Darsil soils; exposed sandstone and shale on the bottom of the gullies
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and backslopes
Kind of material: Residuum derived from sandstone
Slope: 3 to 8 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Excessively drained
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8e
Ecological site—not assigned

Location of a representative area: About 2,150 feet north and 1,920 feet east of the southwest corner of sec. 36, T. 11 N., R. 2 W.

Additional Components

- Newalla and similar soils: 10 percent
- Harrah and similar soils: 4 percent
- Grainola and similar soils: 1 percent
- Littleaxe and similar soils: 1 percent

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

SDND—Stephenville-Darsil-Newalla complex, 3 to 8 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Stephenville and similar soils

Extent of the component in the map unit: 48 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Residuum derived from sandstone
Slope: 5 to 8 percent
Runoff rate: Medium
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 3.1 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—084AY076OK, Sandy Savannah (central)

Typical profile:
A—0 to 3 inches; fine sandy loam
E—3 to 10 inches; loamy fine sand
Bt—10 to 21 inches; sandy clay loam
Cr—21 to 24 inches; weathered bedrock

Location of representative profile: About 2,075 feet north and 200 feet west of the southeast corner of sec. 12, T. 14 N., R. 1 E.

Darsil and similar soils

Extent of the component in the map unit: 25 percent
Geomorphic setting: Hills on uplands

Position on landform: Shoulders
Parent material: Residuum derived from sandstone
Slope: 5 to 8 percent
Runoff rate: High
Depth to paralithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Excessively drained
Available water capacity: About 1.2 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—084AY089OK, Shallow Savannah

Typical profile:
A—0 to 5 inches; loamy fine sand
AC—5 to 16 inches; loamy fine sand
Cr—16 to 18 inches; weathered bedrock

Location of representative profile: About 2,100 feet north and 100 feet west of the southeast corner of sec. 12, T. 14 N., R. 1 E.

Newalla and similar soils

Extent of the component in the map unit: 23 percent
Geomorphic setting: Hills on uplands
Position on landform: Backslopes
Parent material: Residuum derived from sandstone over residuum derived from clayey shale
Slope: 5 to 8 percent
Runoff rate: Very high
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 6.3 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—084AY076OK, Sandy Savannah (central)

Typical profile:
A—0 to 3 inches; fine sandy loam
E—3 to 10 inches; fine sandy loam
Bt—10 to 15 inches; sandy clay loam
2Bt1—15 to 30 inches; silty clay
2Bt2—30 to 41 inches; silty clay
2Cr—41 to 45 inches; weathered bedrock

Location of representative profile: About 2,050 feet north and 275 feet west of the southeast corner of sec. 12, T. 14 N., R. 1 E.

Additional Components

- Rock outcrop: 2 percent
- Grainola and similar soils: 1 percent
- Littleaxe and similar soils: 1 percent

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

SDND2—Stephenville-Darsil-Newalla complex, 3 to 8 percent slopes, eroded

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Stephenville and similar soils

Extent of the component in the map unit: 61 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Residuum derived from sandstone
Slope: 5 to 8 percent
Runoff rate: Medium
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 4.7 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—084AY876OK, Reseeded Sandy Savannah

Typical profile:
Ap—0 to 4 inches; fine sandy loam

Bt1—4 to 17 inches; sandy clay loam
Bt2—17 to 24 inches; sandy clay loam
Bt3—24 to 29 inches; sandy clay loam
Cr—29 to 31 inches; weathered bedrock

Location of representative profile: About 1,400 feet north and 1,040 feet west of the southeast corner of sec. 35, T. 11 N., R. 2 W.

Darsil and similar soils

Extent of the component in the map unit: 20 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders
Parent material: Residuum derived from sandstone
Slope: 5 to 8 percent
Runoff rate: High
Depth to paralithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Excessively drained
Available water capacity: About 1.2 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—084AY889OK, Reseeded Shallow Savannah

Typical profile:
A—0 to 6 inches; loamy fine sand
AC—6 to 14 inches; loamy fine sand
Cr—14 to 16 inches; weathered bedrock

Location of representative profile: About 1,150 feet north and 1,475 feet west of the southeast corner of sec. 35, T. 11 N., R. 2 W.

Newalla and similar soils

Extent of the component in the map unit: 16 percent
Geomorphic setting: Hills on uplands
Position on landform: Backslopes
Parent material: Residuum derived from sandstone over residuum derived from clayey shale
Slope: 5 to 8 percent
Runoff rate: Very high
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 7.5 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—084AY876OK, Reseeded Sandy Savannah

Typical profile:
A—0 to 6 inches; fine sandy loam
Bt—6 to 14 inches; sandy clay loam
2Bt—14 to 44 inches; silty clay
2BC—44 to 50 inches; very gravelly silty clay
2Cr—50 to 55 inches; weathered bedrock

Location of representative profile: About 600 feet south and 1,350 feet west of the northeast corner of sec. 32, T. 11 N., R. 1 E.

Additional Components

- Rock outcrop: 2 percent
- Grainola and similar soils: 1 percent

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

StDC—Stephenville-Darsil complex, 1 to 5 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Stephenville and similar soils

Extent of the component in the map unit: 68 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Residuum derived from sandstone
Slope: 3 to 5 percent
Runoff rate: Low
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 4.3 inches
Depth to a water table: More than 6 feet

Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—084AY076OK, Sandy Savannah (central)

Typical profile:
A—0 to 5 inches; fine sandy loam
E—5 to 8 inches; fine sandy loam
Bt1—8 to 20 inches; sandy clay loam
Bt2—20 to 27 inches; sandy clay loam
Cr—27 to 32 inches; weathered bedrock

Location of representative profile: About 920 feet north and 1,700 feet west of the southeast corner of sec. 36, T. 11 N., R. 2 W.

Darsil and similar soils

Extent of the component in the map unit: 26 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders
Parent material: Residuum derived from sandstone
Slope: 1 to 5 percent
Runoff rate: High
Depth to paralithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Excessively drained
Available water capacity: About 1.2 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—084AY089OK, Shallow Savannah

Typical profile:
A—0 to 4 inches; loamy fine sand
AC—4 to 16 inches; loamy fine sand
Cr—16 to 24 inches; weathered bedrock

Location of representative profile: About 1,180 feet north and 1,200 feet west of the southeast corner of sec. 36, T. 11 N., R. 2 W.

Additional Components

- Newalla and similar soils: 4 percent
- Coyle and similar soils: 1 percent
- Littleaxe and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

StDC2—Stephenville-Darsil complex, 1 to 5 percent slopes, eroded

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Stephenville and similar soils

Extent of the component in the map unit: 66 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Residuum derived from sandstone
Slope: 3 to 5 percent
Runoff rate: Low
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 4.2 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—084AY876OK, Reseeded Sandy Savannah

Typical profile:
Ap—0 to 3 inches; fine sandy loam
Bt1—3 to 6 inches; sandy clay loam
Bt2—6 to 17 inches; sandy clay loam
Bt3—17 to 26 inches; sandy clay loam
Cr—26 to 42 inches; weathered bedrock

Location of representative profile: About 2,520 feet south and 850 feet west of the northeast corner of sec. 36, T. 11 N., R. 2 W.

Darsil and similar soils

Extent of the component in the map unit: 29 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders
Parent material: Residuum derived from sandstone

Slope: 1 to 5 percent
Runoff rate: High
Depth to paralithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Excessively drained
Available water capacity: About 1.2 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—084AY889OK, Reseeded Shallow Savannah

Typical profile:
Ap—0 to 4 inches; loamy fine sand
AC—4 to 15 inches; loamy fine sand
Cr—15 to 20 inches; weathered bedrock

Location of representative profile: About 2,400 feet south and 1,540 feet west of the northeast corner of sec. 36, T. 11 N., R. 2 W.

Additional Components

- Newalla and similar soils: 3 percent
- Coyle and similar soils: 1 percent
- Littleaxe and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

StLC4—Stephenville-Littleaxe complex, 1 to 5 percent slopes, gullied

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Stephenville and similar soils

Extent of the component in the map unit: 50 percent
Geomorphic setting: Hills on uplands
Position on landform: Shoulders and backslopes
Parent material: Residuum derived from sandstone
Slope: 3 to 5 percent
Runoff rate: Low
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 4.8 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—084AY876OK, Reseeded Sandy Savannah

Typical profile:
Ap—0 to 6 inches; fine sandy loam
Bt1—6 to 20 inches; sandy clay loam
Bt2—20 to 30 inches; sandy clay loam
Cr—30 to 40 inches; weathered bedrock

Location of representative profile: About 1,850 feet south and 150 feet east of the northwest corner of sec. 14, T. 11 N., R. 1 E.

Littleaxe and similar soils

Extent of the component in the map unit: 43 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits
Parent material: Residuum derived from sandstone
Slope: 3 to 5 percent
Runoff rate: Low
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 6.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—084AY876OK, Reseeded Sandy Savannah

Typical profile:
Ap—0 to 10 inches; fine sandy loam
Bt1—10 to 24 inches; sandy clay loam
Bt2—24 to 42 inches; sandy clay loam
BC—42 to 52 inches; sandy clay loam
Cr—52 to 56 inches; weathered bedrock

Location of representative profile: About 490 feet south and 1,300 feet east of the northwest corner of sec. 14, T. 11 N., R. 1 E.

Additional Components

- Newalla and similar soils: 4 percent
- Grainola and similar soils: 3 percent

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

SUND—Stephenville-Urban land-Newalla complex, 1 to 8 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Stephenville and similar soils

Extent of the component in the map unit: 47 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Residuum derived from sandstone
Slope: 5 to 8 percent
Runoff rate: Medium
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 4.4 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site—not assigned

Typical profile:
A—0 to 5 inches; fine sandy loam
E—5 to 9 inches; fine sandy loam
Bt1—9 to 22 inches; sandy clay loam
Bt2—22 to 28 inches; sandy clay loam
Cr—28 to 35 inches; weathered bedrock

Location of representative profile: About 350 feet north and 2,600 feet west of the southeast corner of sec. 26, T. 12 N., R. 2 W.

Urban land

Extent of the component in the map unit: 33 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Residuum derived from sandstone and shale
Slope: 1 to 8 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 100 feet south and 1,950 feet west of the northeast corner of sec. 35, T. 12 N., R. 2 W.

Newalla and similar soils

Extent of the component in the map unit: 16 percent
Geomorphic setting: Hills on uplands
Position on landform: Backslopes
Parent material: Residuum derived from sandstone over residuum derived from clayey shale
Slope: 5 to 8 percent
Runoff rate: Very high
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 13.6 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site—not assigned

Typical profile:
Ap—0 to 6 inches; loam
Bt—6 to 11 inches; clay loam
2Bt—11 to 34 inches; silty clay
2Btk—34 to 58 inches; silty clay
Cr—58 to 72 inches; weathered bedrock

Location of representative profile: About 1,420 feet north and 1,700 feet east of the southwest corner of sec. 35, T. 12 N., R. 1 E.

Additional Components

- Darsil and similar soils: 4 percent

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

TevD—Teval loam, 3 to 8 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Teval and similar soils

Extent of the component in the map unit: 89 percent
Geomorphic setting: Stream terraces in valleys
Position on landform: Treads and risers
Parent material: Loamy alluvium
Slope: 5 to 8 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 8.5 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—080AY056OK, Loamy Prairie

Typical profile:
A—0 to 7 inches; loam
BA—7 to 11 inches; clay loam
Bt1—11 to 20 inches; clay loam
Bt2—20 to 38 inches; clay loam
2C1—38 to 50 inches; stratified fine sand to very gravelly clay loam
2C2—50 to 96 inches; stratified very gravelly fine sand to very gravelly clay loam

Location of representative profile: About 2,580 feet north and 1,050 feet west of the southeast corner of sec. 10, T. 14 N., R. 4 W.

Additional Components

- Norge and similar soils: 9 percent
- Harrah and similar soils: 2 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

TevD2—Teval loam, 3 to 8 percent slopes, eroded

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Teval and similar soils

Extent of the component in the map unit: 90 percent
Geomorphic setting: Stream terraces in valleys
Position on landform: Treads and risers
Parent material: Loamy alluvium
Slope: 5 to 8 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 7.3 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e

Ecological site number and name—080AY856OK, Reseeded Loamy Prairie

Typical profile:
A—0 to 5 inches; loam
BA—5 to 9 inches; clay loam
Bt—9 to 21 inches; clay loam
2C1—21 to 51 inches; stratified fine sand to very gravelly clay loam
2C2—51 to 72 inches; stratified very gravelly fine sand to very gravelly clay loam

Location of representative profile: About 1,350 feet south and 650 feet east of the northwest corner of sec. 11, T. 14 N., R. 4 W.

Additional Components

- Norge and similar soils: 10 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

TlrB—Teller fine sandy loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Teller and similar soils

Extent of the component in the map unit: 100 percent
Geomorphic setting: Stream terraces in valleys
Position on landform: Treads
Parent material: Loamy alluvium
Slope: 1 to 3 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 9.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—080AY073OK, Sandy Prairie

Typical profile:
A—0 to 10 inches; fine sandy loam
BA—10 to 18 inches; sandy clay loam
Bt1—18 to 29 inches; sandy clay loam
Bt2—29 to 38 inches; sandy clay loam
Bt3—38 to 47 inches; sandy clay loam
Bt4—47 to 84 inches; loam

Location of representative profile: About 270 feet north and 220 feet west of the southeast corner of sec. 7, T. 12 N., R. 4 W.

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

TlrC—Teller fine sandy loam, 3 to 5 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Teller and similar soils

Extent of the component in the map unit: 98 percent
Geomorphic setting: Stream terraces in valleys
Position on landform: Treads
Parent material: Loamy alluvium
Slope: 3 to 5 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 9.9 inches
Depth to a water table: More than 6 feet

Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—080AY073OK, Sandy Prairie

Typical profile:
A—0 to 12 inches; fine sandy loam
BA—12 to 17 inches; sandy clay loam
Bt1—17 to 33 inches; sandy clay loam
Bt2—33 to 46 inches; sandy clay loam
Bt3—46 to 57 inches; sandy clay loam
C—57 to 79 inches; fine sandy loam

Location of representative profile: About 2,300 feet north and 2,570 feet east of the southwest corner of sec. 26, T. 12 N., R. 2 W.

Additional Components

- Minco and similar soils: 1 percent
- Norge and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

TlrC2—Teller fine sandy loam, 3 to 5 percent slopes, eroded

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Teller and similar soils

Extent of the component in the map unit: 92 percent
Geomorphic setting: Stream terraces in valleys
Position on landform: Treads
Parent material: Loamy alluvium
Slope: 3 to 5 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 9.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—080AY873OK, Reseeded Sandy Prairie

Typical profile:
Ap—0 to 10 inches; loam
Bt1—10 to 17 inches; clay loam
Bt2—17 to 33 inches; clay loam
Bt3—33 to 50 inches; clay loam
Bt4—50 to 74 inches; sandy clay loam
C—74 to 84 inches; very fine sandy loam

Location of representative profile: About 1,550 feet north and 1,300 feet west of the southeast corner of sec. 7, T. 12 N., R. 4 W.

Additional Components

- Norge and similar soils: 6 percent
- Harrah and similar soils: 1 percent
- Slaughterville and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

TlrD—Teller fine sandy loam, 5 to 8 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Teller and similar soils

Extent of the component in the map unit: 93 percent

Geomorphic setting: Stream terraces in valleys
Position on landform: Treads and risers
Parent material: Loamy alluvium
Slope: 5 to 8 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 9.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—080AY073OK, Sandy Prairie

Typical profile:
Ap—0 to 12 inches; loam
BA—12 to 17 inches; sandy clay loam
Bt1—17 to 30 inches; clay loam
Bt2—30 to 48 inches; clay loam
Bt3—48 to 60 inches; sandy clay loam
Bt4—60 to 79 inches; loam

Location of representative profile: About 2,320 feet north and 1,000 feet west of the southeast corner of sec. 7, T. 12 N., R. 4 W.

Additional Components

- Norge and similar soils: 7 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

TlUD—Teller-Urban land complex, 1 to 8 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Teller and similar soils

Extent of the component in the map unit: 62 percent
Geomorphic setting: Stream terraces in valleys
Position on landform: Treads and risers
Parent material: Loamy alluvium
Slope: 5 to 8 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 9.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site—not assigned

Typical profile:
A—0 to 11 inches; fine sandy loam
BA—11 to 17 inches; fine sandy loam
Bt1—17 to 27 inches; sandy clay loam
Bt2—27 to 43 inches; sandy clay loam
Bt3—43 to 58 inches; very fine sandy loam
C—58 to 74 inches; very fine sandy loam

Location of representative profile: About 2,150 feet south and 2,380 feet east of the northwest corner of sec. 30, T. 12 N., R. 2 W.

Urban land

Extent of the component in the map unit: 38 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Stream terraces in valleys
Position on landform: Treads and risers
Parent material: Loamy alluvium
Slope: 1 to 8 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 2,175 feet south and 2,250 feet east of the northwest corner of sec. 30, T. 12 N., R. 2 W.

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

TriA—Tribbey fine sandy loam, 0 to 1 percent slopes, frequently flooded

Map Unit Setting

Major land resource area: 84A
Elevation: 850 to 1,100 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Tribbey and similar soils

Extent of the component in the map unit: 90 percent
Geomorphic setting: Flood plains in valleys
Parent material: Sandy alluvium
Slope: 0 to 1 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Somewhat poorly drained
Available water capacity: About 8.4 inches
Water table: Present
Flooding: Frequent

Interpretive groups:
Land capability classification (nonirrigated)—5w
Ecological site number and name—084AY095OK, Subirrigated

Typical profile:
Ap—0 to 8 inches; fine sandy loam
C1—8 to 15 inches; fine sandy loam
C2—15 to 62 inches; stratified loamy fine sand to loam
Ab—62 to 80 inches; fine sandy loam

Location of representative profile: About 520 feet north and 1,520 feet east of the southwest corner of sec. 24, T. 12 N., R. 1 W.

Additional Components

- Harrah and similar soils: 5 percent
- Pulaski and similar soils: 3 percent
- Easpur and similar soils: 2 percent

Management

Major uses: Pasture and rangeland

For information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

URB—Urban land

Map Unit Setting

Major land resource area: 80A
Elevation: 800 to 1,350 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Urban land

Extent of the component in the map unit: 100 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Parent material: Mine spoil or earthy fill
Slope: 1 to 8 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Very slow

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 520 feet north and 1,300 feet west of the southeast corner of sec. 33, T. 12 N., R. 2 W.

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section

- “Engineering” and “Soil Properties” sections

VanA—Vanoss silt loam, 0 to 1 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Vanoss and similar soils

Extent of the component in the map unit: 85 percent
Geomorphic setting: Terraces on uplands
Position on landform: Treads
Parent material: Fine-silty alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 11.6 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site number and name—080AY056OK, Loamy Prairie

Typical profile:
A—0 to 8 inches; silt loam
BA—8 to 14 inches; silt loam
Bt1—14 to 30 inches; silty clay loam
Bt2—30 to 39 inches; silty clay loam
Bt3—39 to 59 inches; loam
2BC—59 to 76 inches; sandy clay loam

Location of representative profile: About 2,250 feet south and 50 feet west of the northeast corner of sec. 22, T. 12 N., R. 2 W.

Additional Components

- Bethany and similar soils: 9 percent
- Slaughterville and similar soils: 3 percent
- Teller and similar soils: 3 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

VanB—Vanoss silt loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Vanoss and similar soils

Extent of the component in the map unit: 93 percent
Geomorphic setting: Terraces on uplands
Position on landform: Treads
Parent material: Fine-silty alluvium
Slope: 1 to 3 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 10.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—080AY056OK, Loamy Prairie

Typical profile:
Ap—0 to 8 inches; silt loam
A—8 to 14 inches; silt loam
BA—14 to 19 inches; silt loam
Bt1—19 to 33 inches; silty clay loam
Bt2—33 to 52 inches; silty clay loam
2BC—52 to 80 inches; sandy clay loam

Location of representative profile: About 1,950 feet south and 175 feet east of the northwest corner of sec. 23, T. 12 N., R. 2 W.

Additional Components

- Bethany and similar soils: 5 percent

- Slaughterville and similar soils: 1 percent
- Teller and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

W—Water

Map Unit Setting

Major land resource area: 80A
Elevation: 800 to 1,350 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Water

Extent of the component in the map unit: 100 percent
Definition of the component: Water areas that are more than 3 acres in size (2,808 acres consisting of water areas less than 40 acres in size and 6,195 acres consisting of water areas more than 40 acres in size)

Location of a representative area: About 1,200 feet north and 750 feet east of the southwest corner of sec. 2., T. 14 N., R. 3 W.

Management

Major use: Recreation

For information about managing this map unit, see the following sections in Part II of this publication:

- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

WauA—Waurika silt loam, 0 to 1 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,300 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Waurika and similar soils

Extent of the component in the map unit: 100 percent
Geomorphic setting: Terraces on uplands
Position on landform: Treads
Parent material: Clayey alluvium
Slope: 0 to 1 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Somewhat poorly drained
Available water capacity: About 9.2 inches
Water table: Present
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3w
Ecological site number and name—080AY010OK, Claypan Prairie (north)

Typical profile:
Ap—0 to 10 inches; silt loam
E—10 to 13 inches; silt loam
Bt—13 to 38 inches; silty clay
Btk—38 to 69 inches; clay
Btb—69 to 84 inches; silty clay

Location of representative profile: About 2,230 feet north and 2,540 feet west of the southeast corner of sec. 6, T. 12 N., R. 4 W.

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

WtgA—Watonga silty clay, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F

Frost-free period: 210 to 220 days

Major Component Description

Watonga and similar soils

Extent of the component in the map unit: 98 percent
Geomorphic setting: Flood plains in valleys
Parent material: Clayey alluvium
Slope: 0 to 1 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Moderately well drained
Available water capacity: About 9.5 inches
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—3w
Ecological site number and name—080AY045OK, Heavy Bottomland

Typical profile:
Ap—0 to 9 inches; silty clay
A—9 to 25 inches; silty clay
Bkss—25 to 42 inches; silty clay
Ck—42 to 80 inches; silty clay

Location of representative profile: About 1,400 feet north and 2,550 feet east of the southwest corner of sec. 28, T. 12 N., R. 2 W.

Additional Components

- Dale and similar soils: 1 percent
- Reinach and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

WuUA—Watonga-Urban land complex, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 1,000 to 1,200 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Watonga and similar soils

Extent of the component in the map unit: 62 percent
Geomorphic setting: Flood plains in valleys
Parent material: Clayey alluvium
Slope: 0 to 1 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Moderately well drained
Available water capacity: About 9.5 inches
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—3w
Ecological site—not assigned

Typical profile:
Ap—0 to 13 inches; silty clay
Bkss—13 to 34 inches; silty clay
C—34 to 54 inches; silty clay
Ck—54 to 80 inches; silty clay loam

Location of representative profile: About 2,500 feet north and 1,400 feet east of the southwest corner of sec. 35, T. 12 N., R. 3 W.

Urban land

Extent of the component in the map unit: 38 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Flood plains in valleys
Parent material: Clayey mine spoil or earthy fill
Slope: 0 to 1 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 1,450 feet south and 2,225 feet east of the northwest corner of sec. 35, T. 12 N., R. 3 W.

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

YaGA—Yahola-Gaddy complex, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 850 to 1,100 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Yahola and similar soils

Extent of the component in the map unit: 70 percent
Geomorphic setting: Flood plains in valleys
Parent material: Loamy alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately rapid
Drainage class: Well drained
Available water capacity: About 9.3 inches
Depth to a water table: More than 6 feet
Flooding: Occasional

Interpretive groups:
Land capability classification (nonirrigated)—2w
Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
A—0 to 10 inches; fine sandy loam
C1—10 to 24 inches; fine sandy loam
C2—24 to 42 inches; fine sandy loam
C3—42 to 79 inches; stratified loamy fine sand to loam

Location of representative profile: About 1,250 feet south and 2,300 feet east of the northwest corner of sec. 17, T. 12 N., R. 1 E.

Gaddy and similar soils

Extent of the component in the map unit: 30 percent
Geomorphic setting: Flood plains in valleys
Parent material: Sandy alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately rapid
Drainage class: Somewhat excessively drained
Available water capacity: About 5.1 inches
Depth to a water table: More than 6 feet
Flooding: Occasional

Interpretive groups:
Land capability classification (nonirrigated)—3s
Ecological site number and name—080AY068OK, Sandy Bottomland

Typical profile:
A—0 to 8 inches; fine sandy loam
C1—8 to 21 inches; stratified fine sand to clay loam
C2—21 to 80 inches; stratified fine sand to clay loam

Location of representative profile: About 1,000 feet south and 2,200 feet east of the northwest corner of sec. 17, T. 12 N., R. 1 E.

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

YahA—Yahola fine sandy loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 80A
Elevation: 850 to 1,100 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Yahola and similar soils

Extent of the component in the map unit: 90 percent
Geomorphic setting: Flood plains in valleys
Parent material: Loamy alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches

Slowest permeability class within a depth of 60 inches: Moderately rapid
Drainage class: Well drained
Available water capacity: About 8.1 inches
Depth to a water table: More than 6 feet
Flooding: Occasional

Interpretive groups:
Land capability classification (nonirrigated)—2w
Ecological site number and name—080AY050OK, Loamy Bottomland

Typical profile:
Ap—0 to 6 inches; fine sandy loam
C1—6 to 11 inches; fine sandy loam
C2—11 to 71 inches; stratified loamy fine sand to loam
C3—71 to 96 inches; stratified loamy fine sand to loam

Location of representative profile: About 1,040 feet north and 2,500 feet east of the southwest corner of sec. 29, T. 12 N., R. 2 W.

Additional Components

- Canadian and similar soils: 5 percent
- Gaddy and similar soils: 3 percent
- Gracemore and similar soils: 2 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

YaUA—Yahola-Urban land complex, 0 to 1 percent slopes, protected

Map Unit Setting

Major land resource area: 80A
Elevation: 850 to 1,100 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Yahola and similar soils

Extent of the component in the map unit: 57 percent
Geomorphic setting: Flood plains in valleys
Parent material: Loamy alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately rapid
Drainage class: Well drained
Available water capacity: About 9.6 inches
Depth to a water table: More than 6 feet
Flooding: Rare

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site—not assigned

Typical profile:
Ap—0 to 4 inches; loam
C1—4 to 22 inches; fine sandy loam
C2—22 to 48 inches; fine sandy loam
C3—48 to 80 inches; stratified loamy fine sand to loam

Location of representative profile: About 650 feet north and 1,700 feet east of the southwest corner of sec. 30, T. 12 N., R. 2 W.

Urban land

Extent of the component in the map unit: 43 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Flood plains in valleys
Parent material: Loamy mine spoil or earthy fill
Slope: 0 to 1 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 775 feet north and 1,450 feet east of the southwest corner of sec. 30, T. 12 N., R. 2 W.

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

ZanB—Zaneis loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Zaneis and similar soils

Extent of the component in the map unit: 82 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Fine-silty residuum derived from sandstone
Slope: 1 to 3 percent
Runoff rate: Medium
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 8.2 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—080AY056OK, Loamy Prairie

Typical profile:
A—0 to 9 inches; loam
BA—9 to 14 inches; loam
Bt1—14 to 35 inches; clay loam
Bt2—35 to 54 inches; clay loam
Bt3—54 to 59 inches; sandy clay loam
Cr—59 to 72 inches; weathered bedrock

Location of representative profile: About 1,650 feet south and 480 feet west of the northeast corner of sec. 33, T. 12 N., R. 2 W.

Additional Components

- Coyle and similar soils: 11 percent
- Renthin and similar soils: 4 percent
- Kingfisher and similar soils: 1 percent
- Mulhall and similar soils: 1 percent
- Renfrow and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

ZanC—Zaneis loam, 3 to 5 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Zaneis and similar soils

Extent of the component in the map unit: 86 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Fine-silty residuum derived from sandstone
Slope: 3 to 5 percent
Runoff rate: Medium
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 8.2 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—080AY056OK, Loamy Prairie

Typical profile:
A—0 to 12 inches; loam
BA—12 to 19 inches; loam
Bt1—19 to 31 inches; clay loam
Bt2—31 to 48 inches; sandy clay loam
BC—48 to 59 inches; sandy clay loam
Cr—59 to 65 inches; weathered bedrock

Location of representative profile: About 100 feet south and 1,000 feet east of the northwest corner of sec. 6, T. 14 N., R. 2 W.

Additional Components

- Coyle and similar soils: 7 percent
- Mulhall and similar soils: 2 percent
- Renfrow and similar soils: 2 percent
- Huska and similar soils: 1 percent

- Kingfisher and similar soils: 1 percent
- Renthin and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

ZanC2—Zaneis loam, 3 to 5 percent slopes, eroded

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Zaneis and similar soils

Extent of the component in the map unit: 81 percent
Geomorphic setting: Hills on uplands
Position on landform: Backslopes
Parent material: Fine-silty residuum derived from sandstone
Slope: 3 to 5 percent
Runoff rate: Medium
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 8.2 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—080AY856OK, Reseeded Loamy Prairie

Typical profile:
Ap—0 to 12 inches; loam
Bt1—12 to 30 inches; clay loam
Bt2—30 to 40 inches; clay loam
Bt3—40 to 47 inches; sandy clay loam
Bt4—47 to 55 inches; sandy clay loam
Cr—55 to 65 inches; weathered bedrock

Location of representative profile: About 1,750 feet south and 700 feet east of the northwest corner of sec. 16, T. 12 N., R. 2 W.

Additional Components

- Coyle and similar soils: 10 percent
- Huska and similar soils: 4 percent
- Renfrow and similar soils: 2 percent
- Kingfisher and similar soils: 1 percent
- Mulhall and similar soils: 1 percent
- Piedmont and similar soils: 1 percent

Management

Major uses: Pasture, rangeland, and cropland

For information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

ZaUC—Zaneis-Urban land complex, 1 to 5 percent slopes

Map Unit Setting

Major land resource area: 80A
Elevation: 950 to 1,250 feet
Mean annual precipitation: 32 to 36 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 210 to 220 days

Major Component Description

Zaneis and similar soils

Extent of the component in the map unit: 57 percent
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Fine-silty residuum derived from sandstone
Slope: 3 to 5 percent
Runoff rate: Medium
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 6.9 inches
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site—not assigned

Typical profile:
Ap—0 to 10 inches; loam
BA—10 to 16 inches; clay loam
Bt1—16 to 23 inches; clay loam
Bt2—23 to 32 inches; sandy clay loam
Bt3—32 to 42 inches; sandy clay loam
Cr—42 to 50 inches; weathered bedrock

Location of representative profile: About 1,050 feet north and 1,450 feet west of the southeast corner of sec. 15, T. 12 N., R. 3 W.

Urban land

Extent of the component in the map unit: 43 percent
Definition of the component: Mostly residential areas, business areas, streets, and parking areas
Geomorphic setting: Hills on uplands
Position on landform: Summits and backslopes
Parent material: Fine-silty earthy fill weathered from sandstone
Slope: 1 to 5 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Depth to a water table: More than 6 feet
Flooding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Location of a representative area: About 1,050 feet north and 1,750 feet west of the southeast corner of sec. 15, T. 12 N., R. 3 W.

Management

Major use: Urban development

For information about managing this map unit, see the following sections in Part II of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Butte. An isolated small mountain or hill with steep or precipitous sides and a top variously flat, rounded, or pointed that may be a residual mass isolated by erosion or an exposed volcanic neck.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Cemented material. Material in an air-dry test specimen that does not slake after being immersed in water for 1 hour. Cemented soil material has a brittle, hard consistence caused by some cementing agent other than clay. Calcium carbonate, silica, or oxides or salts of iron and aluminum are common cementing materials.

Channeled. Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clayey soil. Silty clay, sandy clay, or clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Closed depression. A low area completely surrounded by higher ground and having no natural outlet.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

Consolidated sandstone. Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

Consolidated shale. Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

Consolidated siltstone. Siltstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coppice dune. A small dune of fine grained soil material stabilized around shrubs or small trees.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cuesta. A hill or ridge that has a gentle slope on one side and a steep slope on the other; specifically, an asymmetric, homoclinal ridge capped by resistant rock layers of slight or moderate dip.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deep soil. A soil that is 40 to 60 inches deep to bedrock or to other material that restricts the penetration of plant roots.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Delta. A body of alluvium having a surface that is nearly flat and fan shaped; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area that is at a lower elevation than the surrounding area, that collects water, and is drained into a closed depression or lake or into a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind or proportion of species or total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess salt (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited

rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Gypsum. A mineral consisting of hydrous calcium sulfate.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Heavy metal. Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion

until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Knoll. A small, low, rounded hill rising above adjacent landforms.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesa. A broad, nearly flat topped and commonly isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Microhigh. An area that is 2 to 12 inches higher than the adjacent microlow.

Microlow. An area that is 2 to 12 inches lower than the adjacent microhigh.
Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.
Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.
Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.
Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.
Moderately deep soil. A soil that is 20 to 40 inches deep to bedrock or to other material that restricts the penetration of plant roots.
Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.
Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.
Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.
Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).
Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.
Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.
Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.
Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)
Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.
Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.
Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.
Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.
Parent material. The unconsolidated organic and mineral material in which soil forms.
Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.
Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.
Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.
Percolation. The movement of water through the soil.
Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.
Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Impermeable	less than 0.0015 inch
Very slow	0.0015 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with a relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Range condition. The present composition of the plant community on a site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination

of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relict stream terrace. One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Ridge. A long, narrow elevation of the land surface. It generally is sharp crested and forms an extended upland between valleys.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline	0 to 2
Very slightly saline	2 to 4
Slightly saline	4 to 8
Moderately saline	8 to 16
Strongly saline	more than 16

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sediment. Solid, clastic material, both mineral and organic, that is in suspension, is being transported or has been moved from its site of origin by water, wind, ice, or mass wasting, and has come to rest on the earth's surface either above or below sea level.

Sedimentary plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief

kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Sedimentary uplands. Land areas of bedrock formed from water- or wind-deposited sediments. They are higher on the landscape than the flood plains.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Semiconsolidated sedimentary beds. Soft geologic sediments that disperse when fragments are placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shallow soil. A soil that is 10 to 20 inches deep to bedrock or to other material that restricts the penetration of plant roots.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 1 percent
Very gently sloping	1 to 3 percent
Gently sloping	3 to 5 percent
Moderately sloping	5 to 8 percent
Strongly sloping	8 to 12 percent
Moderately steep	12 to 20 percent
Steep	20 to 45 percent
Very steep	45 percent and higher

Classes for complex slopes are as follows:

Nearly level	0 to 3 percent
Gently undulating	1 to 5 percent
Undulating	1 to 8 percent
Gently rolling	5 to 12 percent
Rolling	5 to 15 percent
Hilly	8 to 30 percent
Steep	20 to 45 percent
Very steep	45 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent

or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to Ca^{++} + Mg^{++}. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of rock fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Strath terrace. A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and consists of the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Tailwater. The water directly downstream of a structure.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

Tread. The relatively flat terrace surface that was cut or built by stream or wave action.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. Alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Very deep soil. A soil that is more than 60 inches deep to bedrock or to other material that restricts the penetration of plant roots.

Very shallow soil. A soil that is less than 10 inches deep to bedrock or to other material that restricts the penetration of plant roots.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with the Oklahoma Agricultural Experiment Station and the Oklahoma Conservation Commission

Soil Survey of Oklahoma County, Oklahoma

Part II

How To Use This Soil Survey

This survey consists of maps and text. The maps include a general soil map and detailed soil maps. The text is divided into two parts. Part I includes general information about the survey area; descriptions of the general soil map units, detailed soil map units, and soil series in the area; and a description of how the soils formed. Part II describes the use and management of the soils and the major soil properties. This part may be updated as further information about soil management becomes available.

On the **general soil map**, the survey area is divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas. To find information about your general area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, and then refer to the section **General Soil Map Units** in Part I of this survey for a general description of the soils in your area.

The **detailed soil maps**, when used in conjunction with the detailed soil map unit descriptions in Part I of this publication, can be useful in planning the use and management of small areas. To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet. Locate your area of interest on the map sheet. Note the map unit symbols in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1995. Soil names and descriptions were approved in 1996. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1996. This survey was made cooperatively by the Natural Resources Conservation Service, the Oklahoma Agricultural Experiment Station, and the Oklahoma Conservation Commission. It is part of the technical assistance furnished to the Oklahoma County Conservation District.

Cover: State Capitol Building in Oklahoma City, Oklahoma.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service homepage on the World Wide Web. The address is http://www.nrcs.usda.gov.

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Soil Survey of
Oklahoma County, Oklahoma

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Interpretive ratings help engineers, planners, and others understand how soil properties influence important nonagricultural uses, such as building site development and construction materials. The ratings indicate the most restrictive soil features affecting the suitability of the soils for these uses.

Soils are rated in their natural state. No unusual modification of the soil site or material is made other than that which is considered normal practice for the rated use. Even though soils may have limitations, it is important to remember that engineers and others can modify soil features or can design or adjust the plans for a structure to compensate for most of the limitations. Most of these practices, however, are costly. The final decision in selecting a site for a particular use generally involves weighing the costs of site preparation and maintenance.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

The classification and extent of the soils in this survey area are shown in the tables “Classification of the Soils” and “Acreage and Proportionate Extent of the Soils,” which are in this section.

Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
AhpA	Ashport silty clay loam, 0 to 1 percent slopes, occasionally flooded-----	1,734	0.4
AmbE	Amber very fine sandy loam, 5 to 15 percent slopes, rarely flooded-------	953	0.2
AshA	Asher silty clay loam, 0 to 1 percent slopes, rarely flooded------------	2,118	0.5
AspA	Ashport silt loam, 0 to 1 percent slopes, occasionally flooded-----------	3,473	0.8
AstA	Ashport silt loam, 0 to 1 percent slopes, frequently flooded------------	8,488	1.8
BetA	Bethany silt loam, 0 to 1 percent slopes--------------------------------	1,572	0.3
BetB	Bethany silt loam, 1 to 3 percent slopes--------------------------------	1,263	0.3
BeUB	Bethany-Urban land complex, 0 to 3 percent slopes-----------------------	4,851	1.1
CaaA	Canadian fine sandy loam, 0 to 1 percent slopes, rarely flooded----------	158	*
CaUB	Canadian-Urban land complex, 0 to 1 percent slopes, rarely flooded-------	304	*
CoIC2	Coyle-Ironmound complex, 3 to 5 percent slopes, eroded------------------	598	0.1
CoUB	Coyle-Urban land complex, 1 to 3 percent slopes-------------------------	619	0.1
CoyB	Coyle loam, 1 to 3 percent slopes---------------------------------------	499	0.1
DalA	Dale silt loam, 0 to 1 percent slopes, rarely flooded-------------------	2,860	0.6
DAM	Dams--	147	*
DaUA	Dale-Urban land complex, 0 to 1 percent slopes, rarely flooded-----------	1,579	0.3
DeDE	Derby-Dougherty complex, 0 to 15 percent slopes-------------------------	1,703	0.4
DerB	Derby loamy fine sand, 0 to 3 percent slopes----------------------------	658	0.1
DerE	Derby loamy fine sand, 8 to 15 percent slopes---------------------------	1,298	0.3
DleA	Dale silty clay loam, 0 to 1 percent slopes, rarely flooded-------------	374	*
DSRG	Darsil-Stephenville-Rock outcrop complex, 3 to 45 percent slopes---------	934	0.2
DUDE	Derby-Urban land-Dougherty complex, 0 to 15 percent slopes--------------	2,221	0.5
EasA	Easpur loam, 0 to 1 percent slopes, occasionally flooded----------------	1,516	0.3
GaGA	Gaddy-Gracemore complex, 0 to 1 percent slopes, frequently flooded-------	3,016	0.7
GcmA	Gracemont silty clay, 0 to 1 percent slopes, frequently flooded, overwash	2,102	0.5
GmtA	Gracemont fine sandy loam, 0 to 1 percent slopes, occasionally flooded---	1,258	0.3
GraC	Grainola silty clay loam, 3 to 5 percent slopes-------------------------	750	0.2
GrAD	Grainola-Ashport complex, 0 to 8 percent slopes-------------------------	6,857	1.5
GrHC	Grant-Huska complex, 1 to 5 percent slopes------------------------------	214	*
GrIE	Grainola-Ironmound complex, 3 to 12 percent slopes----------------------	6,488	1.4
GrPB2	Grainola-Piedmont complex, 1 to 3 percent slopes, eroded----------------	1,241	0.3
GrPC2	Grainola-Piedmont complex, 3 to 5 percent slopes, eroded----------------	3,784	0.8
GUIE	Grainola-Urban land-Ironmound complex, 3 to 12 percent slopes-----------	4,047	0.9
HarC	Harrah fine sandy loam, 3 to 5 percent slopes---------------------------	36,365	7.9
HarC2	Harrah fine sandy loam, 3 to 5 percent slopes, eroded-------------------	4,717	1.0
HarC4	Harrah fine sandy loam, 3 to 5 percent slopes, gullied------------------	702	0.2
HarG	Harrah fine sandy loam, 3 to 45 percent slopes--------------------------	6,713	1.5
HaUC	Harrah-Urban land complex, 3 to 5 percent slopes------------------------	3,737	0.8
HiLA	Hibsaw-Lomill complex, 0 to 1 percent slopes, occasionally flooded-------	489	0.1
IrCE	Ironmound-Coyle complex, 5 to 15 percent slopes-------------------------	1,194	0.3
IrKD	Ironmound-Kingfisher complex, 1 to 8 percent slopes---------------------	540	0.1
KekA	Keokuk very fine sandy loam, 0 to 1 percent slopes, rarely flooded-------	2,299	0.5
KeoA	Keokuk very fine sandy loam, 0 to 1 percent slopes, occasionally flooded	1,119	0.2
KeUA	Keokuk-Urban land complex, 0 to 1 percent slopes, rarely flooded---------	493	0.1
KgIC	Kingfisher-Ironmound complex, 1 to 5 percent slopes---------------------	1,080	0.2
KowB	Konawa fine sandy loam, 1 to 3 percent slopes---------------------------	2,729	0.6
KowD	Konawa fine sandy loam, 3 to 8 percent slopes---------------------------	3,635	0.8
KowD2	Konawa fine sandy loam, 3 to 8 percent slopes, eroded-------------------	2,697	0.6
KowD4	Konawa fine sandy loam, 3 to 8 percent slopes, gullied------------------	503	0.1
KrdA	Kirkland silt loam, 0 to 1 percent slopes-------------------------------	8,917	1.9
KrUA	Kirkland-Urban land complex, 0 to 1 percent slopes----------------------	9,659	2.1
KUIC	Kingfisher-Urban land-Ironmound complex, 1 to 5 percent slopes-----------	412	*
KwUD	Konawa-Urban land complex, 1 to 8 percent slopes------------------------	2,833	0.6
LarA	Lawrie silt loam, 0 to 1 percent slopes, occasionally flooded-----------	1,672	0.4
LatG	Latrass loam, 1 to 45 percent slopes------------------------------------	1,407	0.3
LawA	Lawrie loam, 0 to 1 percent slopes, rarely flooded----------------------	754	0.2
LitB	Littleaxe fine sandy loam, 1 to 3 percent slopes------------------------	7,248	1.6
LitC	Littleaxe fine sandy loam, 3 to 5 percent slopes------------------------	1,911	0.4
LitC2	Littleaxe fine sandy loam, 3 to 5 percent slopes, eroded----------------	1,541	0.3
LomA	Lomill silty clay loam, 0 to 1 percent slopes, occasionally flooded------	1,084	0.2
LtUC	Littleaxe-Urban land complex, 1 to 5 percent slopes---------------------	2,607	0.6
LweA	Lawrie silty clay loam, 0 to 1 percent slopes, occasionally flooded------	912	0.2

See footnote at end of table.

Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
LwfA	Lawrie fine sandy loam, 0 to 1 percent slopes, occasionally flooded	1,209	0.3
LwUA	Lawrie-Urban land complex, 0 to 1 percent slopes, rarely flooded	1,970	0.4
MlfA	Miller fine sandy loam, 0 to 1 percent slopes, occasionally flooded, overwash	257	*
MllA	Miller silty clay, 0 to 1 percent slopes, occasionally flooded	2,188	0.5
M-W	Miscellaneous water	261	*
NewB	Newalla fine sandy loam, 1 to 3 percent slopes	761	0.2
NewC2	Newalla fine sandy loam, 3 to 5 percent slopes, eroded	575	0.1
NorB	Norge silt loam, 1 to 3 percent slopes	2,003	0.4
NorC	Norge silt loam, 3 to 5 percent slopes	1,141	0.2
NorC2	Norge silt loam, 3 to 5 percent slopes, eroded	1,235	0.3
NoUC	Norge-Urban land complex, 1 to 5 percent slopes	6,689	1.5
PdHC	Piedmont-Huska complex, 1 to 5 percent slopes	1,214	0.3
PieC2	Piedmont silty clay loam, 3 to 5 percent slopes, eroded	110	*
PimB	Piedmont silt loam, 1 to 3 percent slopes	1,709	0.4
PimC	Piedmont silt loam, 3 to 5 percent slopes	1,874	0.4
PIT	Pits	1,881	0.4
PukA	Pulaski fine sandy loam, 0 to 1 percent slopes, frequently flooded	1,884	0.4
PulA	Pulaski fine sandy loam, 0 to 1 percent slopes, occasionally flooded	7,113	1.5
RenB	Renfrow silt loam, 1 to 3 percent slopes	5,851	1.3
RinB	Renthin silt loam, 1 to 3 percent slopes	5,641	1.2
RnnB	Renthin silty clay loam, 1 to 3 percent slopes	2,523	0.5
RnnC2	Renthin silty clay loam, 3 to 5 percent slopes, eroded	12,428	2.7
RnUC	Renthin-Urban land complex, 1 to 5 percent slopes	23,843	5.2
SDGD4	Stephenville-Darsil-Gullied land complex, 3 to 8 percent slopes	8,122	1.8
SDND	Stephenville-Darsil-Newalla complex, 3 to 8 percent slopes	59,949	13.0
SDND2	Stephenville-Darsil-Newalla complex, 3 to 8 percent slopes, eroded	10,142	2.2
StDC	Stephenville-Darsil complex, 1 to 5 percent slopes	24,797	5.4
StDC2	Stephenville-Darsil complex, 1 to 5 percent slopes, eroded	4,250	0.9
StLC4	Stephenville-Littleaxe complex, 1 to 5 percent slopes, gullied	409	*
SUND	Stephenville-Urban land-Newalla complex, 1 to 8 percent slopes	12,345	2.7
TevD	Teval loam, 3 to 8 percent slopes	506	0.1
TevD2	Teval loam, 3 to 8 percent slopes, eroded	266	*
TlrB	Teller fine sandy loam, 1 to 3 percent slopes	1,356	0.3
TlrC	Teller fine sandy loam, 3 to 5 percent slopes	1,403	0.3
TlrC2	Teller fine sandy loam, 3 to 5 percent slopes, eroded	819	0.2
TlrD	Teller fine sandy loam, 5 to 8 percent slopes	305	*
TlUD	Teller-Urban land complex, 1 to 8 percent slopes	8,305	1.8
TriA	Tribbey fine sandy loam, 0 to 1 percent slopes, frequently flooded	8,524	1.9
URB	Urban land	31,475	6.8
VanA	Vanoss silt loam, 0 to 1 percent slopes	170	*
VanB	Vanoss silt loam, 1 to 3 percent slopes	404	*
W	Water	9,003	2.0
WauA	Waurika silt loam, 0 to 1 percent slopes	120	*
WtgA	Watonga silty clay, 0 to 1 percent slopes, rarely flooded	2,157	0.5
WuUA	Watonga-Urban land complex, 0 to 1 percent slopes, rarely flooded	674	0.1
YaGA	Yahola-Gaddy complex, 0 to 1 percent slopes, occasionally flooded	677	0.1
YahA	Yahola fine sandy loam, 0 to 1 percent slopes, occasionally flooded	4,106	0.9
YaUA	Yahola-Urban land complex, 0 to 1 percent slopes, protected	2,543	0.6
ZanB	Zaneis loam, 1 to 3 percent slopes	1,126	0.2
ZanC	Zaneis loam, 3 to 5 percent slopes	653	0.1
ZanC2	Zaneis loam, 3 to 5 percent slopes, eroded	531	0.1
ZaUC	Zaneis-Urban land complex, 1 to 5 percent slopes	659	0.1
	Total	459,802	100.0

* Less than 0.1 percent. The combined extent of the soils assigned an asterisk in the "Percent" column is about 0.9 percent of the survey area.

Classification of the Soils

Soil name	Family or higher taxonomic class
Amber	Coarse-silty, mixed, superactive, thermic Udic Haplustepts
Asher	Fine-silty, mixed, superactive, thermic Fluventic Haplustolls
Ashport	Fine-silty, mixed, superactive, thermic Fluventic Haplustolls
Bethany	Fine, mixed, superactive, thermic Pachic Paleustolls
Canadian	Coarse-loamy, mixed, superactive, thermic Udic Haplustolls
Coyle	Fine-loamy, siliceous, active, thermic Udic Argiustolls
Dale	Fine-silty, mixed, superactive, thermic Pachic Haplustolls
Darsil	Thermic, shallow and coated Ustic Quartzipsamments
Derby	Mixed, thermic Lamellic Ustipsamments
Dougherty	Loamy, mixed, active, thermic Arenic Haplustalfs
Easpur	Fine-loamy, mixed, superactive, thermic Fluventic Haplustolls
Gaddy	Sandy, mixed, thermic Udic Ustifluvents
Gracemont	Coarse-loamy, mixed, superactive, calcareous, thermic Oxyaquic Udifluvents
Gracemore	Sandy, mixed, thermic Oxyaquic Udifluvents
Grainola	Fine, mixed, active, thermic Udertic Haplustalfs
Grant	Fine-silty, mixed, superactive, thermic Udic Argiustolls
Harrah	Fine-loamy, siliceous, active, thermic Ultic Paleustalfs
Hibsaw	Fine-silty, mixed, superactive, nonacid, thermic Aeric Halaquepts
Huska	Fine, mixed, superactive, thermic Mollic Natrustalfs
Ironmound	Loamy, mixed, active, thermic, shallow Udic Haplustepts
Keokuk	Coarse-silty, mixed, superactive, thermic Fluventic Haplustolls
Kingfisher	Fine-silty, mixed, active, thermic Udic Argiustolls
Kirkland	Fine, mixed, superactive, thermic Udertic Paleustolls
Konawa	Fine-loamy, mixed, active, thermic Ultic Haplustalfs
Latrass	Fine, mixed, active, nonacid, thermic Haplic Ustarents
Lawrie	Fine-silty, mixed, superactive, thermic Pachic Argiustolls
Littleaxe	Fine-loamy, siliceous, active, thermic Ultic Haplustalfs
Lomill	Clayey over loamy, mixed, superactive, thermic Udertic Haplustolls
Miller	Fine, mixed, superactive, thermic Udertic Haplustolls
Newalla	Fine-loamy over clayey, siliceous, superactive, thermic Udic Haplustalfs
Norge	Fine-silty, mixed, active, thermic Udic Paleustolls
Piedmont	Fine, mixed, superactive, thermic Udertic Argiustolls
Pulaski	Coarse-loamy, mixed, superactive, nonacid, thermic Udic Ustifluvents
Renfrow	Fine, mixed, superactive, thermic Udertic Paleustolls
Renthin	Fine, mixed, superactive, thermic Udertic Argiustolls
Stephenville	Fine-loamy, siliceous, active, thermic Ultic Haplustalfs
Teller	Fine-loamy, mixed, active, thermic Udic Argiustolls
Teval	Fine-loamy, mixed, active, thermic Udic Argiustolls
Tribbey	Coarse-loamy, mixed, superactive, nonacid, thermic Oxyaquic Udifluvents
Vanoss	Fine-silty, mixed, superactive, thermic Udic Argiustolls
Watonga	Fine, smectitic, thermic Udic Haplusterts
Waurika	Fine, smectitic, thermic Vertic Argialbolls
Yahola	Coarse-loamy, mixed, superactive, calcareous, thermic Udic Ustifluvents
Zaneis	Fine-loamy, siliceous, active, thermic Udic Argiustolls

Agronomy

General management concerns affecting crops, hay, and pasture are identified in this section. The system of land capability classification used by the Natural Resources Conservation Service is explained, the estimated yields of the main crops and hay and pasture plants are listed for each soil, and the soils that meet the requirements for prime farmland are identified.

Planners of management systems for individual fields or farms should consider obtaining specific information from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, or for engineering purposes.

In the capability system, soils generally are grouped at three levels: capability class, subclass, and unit (USDA, 1961). These levels indicate the degree and kinds of limitations affecting mechanized farming systems that produce the more commonly grown field crops, such as corn, small grain, cotton, hay, and field-grown vegetables. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Arabic numerals 1 through 8. The numerals indicate progressively greater limitations and narrower choices for practical use.

If properly managed, soils in classes 1, 2, 3, and 4 are suitable for the mechanized production of commonly grown field crops and for pasture and woodland. The degree of the soil limitations affecting the production of cultivated crops increases progressively from class 1 to class 4. The limitations can affect levels of production and the risk of permanent soil deterioration caused by erosion and other factors.

Soils in classes 5, 6, and 7 are generally not suited to the mechanized production of commonly grown field crops without special management, but they are suitable for plants that provide a permanent cover, such as grasses and trees. The severity of the soil limitations affecting crops increases progressively from class 5 to class 7. The local office of the Natural Resources Conservation Service or the Cooperative Extension Service can provide guidance on the use of these soils as cropland.

Areas in class 8 are generally not suitable for crops, pasture, rangeland, or woodland. These areas may have potential for other uses, such as recreational facilities and wildlife habitat.

Capability subclasses identify the dominant kind of limitation in the class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

There are no subclasses in class 1 because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use mainly to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the table “Land Capability and Yields per Acre of Crops,” which is in this section.

Estimated Yields of Crops, Hay, and Pasture

The average yields per acre that can be expected of the principal crops and hay and pasture plants under a high level of management are shown in the tables “Land Capability and Yields per Acre of Crops” and “Yields per Acre of Hay and Pasture.” In any given year, yields may be higher or lower than those indicated in the tables because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops or hay or pasture plants. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in the tables are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small.

Under good pasture management, proper grazing is essential for the production of high-quality forage, stand survival, and erosion control. Proper grazing helps plants to maintain sufficient and generally vigorous top growth during the growing season. Brush control is essential in many areas, and weed control generally is needed. Rotation grazing and renovation also are important management practices.

A pasture program is needed to provide the desired amount of forage during each month of the year. A study of the growth habits of the different plants is necessary to ensure adequate forage during each month. The months that various kinds of forage plants grow are indicated in figure 10, which is in the “Range” section of this survey (page 47). The percent growth that can be safely grazed each month without substantially reducing the total yield for each kind of plant is illustrated.

Yield estimates are often indicated in animal unit months (AUM), or the amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about forage yields other than those shown in the table “Yields per Acre of Hay and Pasture.”

Land Capability and Yields per Acre of Crops

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Map symbol and soil name	Land capability	Corn	Grain sorghum	Oats	Soybeans	Wheat
		Bu	*Bu*	*Bu*	*Bu*	*Bu*
AhpA:						
Ashport	2w	80.0	55.0	60.0	35.0	40.0
AmbE:						
Amber	6e	---	---	---	---	---
AshA:						
Asher	1	100.0	60.0	60.0	35.0	40.0
AspA:						
Ashport	2w	80.0	50.0	60.0	35.0	40.0
AstA:						
Ashport	5w	---	---	---	---	---
BetA:						
Bethany	1	---	45.0	55.0	---	40.0
BetB:						
Bethany	2e	---	45.0	50.0	---	40.0
BeUB:						
Bethany	2e	---	---	---	---	---
Urban land	8s	---	---	---	---	---
CaaA:						
Canadian	1	100.0	50.0	55.0	30.0	40.0
CaUB:						
Canadian	1	---	---	---	---	---
Urban land	8s	---	---	---	---	---
CoIC2:						
Coyle	3e	---	---	---	---	25.0
Ironmound	3e	---	---	---	---	15.0
CoUB:						
Coyle	2e	---	---	---	---	---
Urban land	8s	---	---	---	---	---
CoyB:						
Coyle	2e	---	35.0	40.0	---	30.0
DalA:						
Dale	1	100.0	60.0	60.0	35.0	40.0
DAM:						
Dams	8s	---	---	---	---	---
DaUA:						
Dale	1	---	---	---	---	---
Urban land	8s	---	---	---	---	---

Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Grain sorghum	Oats	Soybeans	Wheat
		Bu	*Bu*	*Bu*	*Bu*	*Bu*
DeDE:						
Derby	6e	---	---	---	---	---
Dougherty	6e	---	---	---	---	---
DerB:						
Derby	3s	---	---	---	---	15.0
DerE:						
Derby	6e	---	---	---	---	---
DleA:						
Dale	1	100.0	60.0	60.0	35.0	40.0
DSRG:						
Darsil	7e	---	---	---	---	---
Stephenville	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
DUDE:						
Derby	6e	---	---	---	---	---
Urban land	8s	---	---	---	---	---
Dougherty	6e	---	---	---	---	---
EasA:						
Easpur	2w	80.0	50.0	55.0	30.0	35.0
GaGA:						
Gaddy	5w	---	---	---	---	---
Gracemore	5w	---	---	---	---	---
GcmA:						
Gracemont	5w	---	---	---	---	---
GmtA:						
Gracemont	4w	70.0	35.0	35.0	---	25.0
GraC:						
Grainola	4e	---	30.0	25.0	---	20.0
GrAD:						
Grainola	6e	---	---	---	---	---
Ashport	5w	---	---	---	---	---
GrHC:						
Grant	3e	---	40.0	35.0	---	35.0
Huska	4s	---	20.0	20.0	---	15.0
GrIE:						
Grainola	6e	---	---	---	---	---
Ironmound	6e	---	---	---	---	---
GrPB2:						
Grainola	4e	---	---	15.0	---	10.0

Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Grain sorghum	Oats	Soybeans	Wheat
		Bu	*Bu*	*Bu*	*Bu*	*Bu*
GrPB2:						
Piedmont	3e	---	---	25.0	---	25.0
GrPC2:						
Grainola	4e	---	---	15.0	---	10.0
Piedmont	3e	---	---	20.0	---	20.0
GUIE:						
Grainola	6e	---	---	---	---	---
Urban land	8s	---	---	---	---	---
Ironmound	6e	---	---	---	---	---
HarC:						
Harrah	3e	---	40.0	40.0	---	30.0
HarC2:						
Harrah	4e	---	30.0	35.0	---	25.0
HarC4:						
Harrah	6e	---	---	---	---	---
HarG:						
Harrah	7e	---	---	---	---	---
HaUC:						
Harrah	3e	---	---	---	---	---
Urban land	8s	---	---	---	---	---
HiLA:						
Hibsaw	6s	---	20.0	20.0	---	10.0
Lomill	3w	---	40.0	45.0	---	30.0
IrCE:						
Ironmound	6e	---	---	---	---	---
Coyle	6e	---	---	---	---	---
IrKD:						
Ironmound	4e	---	---	---	---	10.0
Kingfisher	4e	---	---	---	---	25.0
KekA:						
Keokuk	1	100.0	60.0	60.0	35.0	40.0
KeoA:						
Keokuk	2w	100.0	55.0	60.0	35.0	40.0
KeUA:						
Keokuk	1	---	---	---	---	---
Urban land	8s	---	---	---	---	---
KgIC:						
Kingfisher	3e	---	35.0	35.0	---	25.0
Ironmound	3s	---	---	15.0	---	15.0

Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Grain sorghum	Oats	Soybeans	Wheat
		Bu	*Bu*	*Bu*	*Bu*	*Bu*
KowB:						
Konawa------------------	2e	---	40.0	40.0	---	30.0
KowD:						
Konawa------------------	4e	---	30.0	30.0	---	25.0
KowD2:						
Konawa------------------	4e	---	25.0	30.0	---	20.0
KowD4:						
Konawa------------------	6e	---	---	---	---	---
KrdA:						
Kirkland----------------	2s	---	35.0	40.0	---	35.0
KrUA:						
Kirkland----------------	2s	---	---	---	---	---
Urban land--------------	8s	---	---	---	---	---
KUIC:						
Kingfisher--------------	3e	---	---	---	---	---
Urban land--------------	8s	---	---	---	---	---
Ironmound---------------	3s	---	---	---	---	---
KwUD:						
Konawa------------------	4e	---	---	---	---	---
Urban land--------------	8s	---	---	---	---	---
LarA:						
Lawrie------------------	1	80.0	60.0	60.0	35.0	40.0
LatG:						
Latrass-----------------	8s	---	---	---	---	---
LawA:						
Lawrie------------------	1	80.0	60.0	60.0	35.0	40.0
LitB:						
Littleaxe---------------	2e	---	35.0	35.0	---	30.0
LitC:						
Littleaxe---------------	3e	---	30.0	30.0	---	25.0
LitC2:						
Littleaxe---------------	3e	---	25.0	25.0	---	20.0
LomA:						
Lomill------------------	3w	70.0	40.0	45.0	25.0	30.0
LtUC:						
Littleaxe---------------	3e	---	---	---	---	---
Urban land--------------	8s	---	---	---	---	---
LweA:						
Lawrie------------------	1	80.0	60.0	60.0	35.0	40.0
LwfA:						
Lawrie------------------	1	80.0	55.0	60.0	35.0	40.0

Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Grain sorghum	Oats	Soybeans	Wheat
		Bu	*Bu*	*Bu*	*Bu*	*Bu*
LwUA:						
Lawrie------------------	1	---	---	---	---	---
Urban land--------------	8s	---	---	---	---	---
MlfA:						
Miller------------------	2w	70.0	40.0	45.0	25.0	30.0
MllA:						
Miller------------------	3w	70.0	40.0	45.0	25.0	30.0
M-W:						
Miscellaneous water.						
NewB:						
Newalla-----------------	3s	---	35.0	35.0	---	25.0
NewC2:						
Newalla-----------------	4e	---	25.0	---	---	15.0
NorB:						
Norge-------------------	2e	---	40.0	50.0	---	40.0
NorC:						
Norge-------------------	3e	---	35.0	45.0	---	25.0
NorC2:						
Norge-------------------	3e	---	30.0	35.0	---	30.0
NoUC:						
Norge-------------------	3e	---	---	---	---	---
Urban land--------------	8s	---	---	---	---	---
PdHC:						
Piedmont----------------	2e	---	---	30.0	---	30.0
Huska-------------------	4s	---	---	20.0	---	15.0
PieC2:						
Piedmont----------------	3e	---	---	25.0	---	20.0
PimB:						
Piedmont----------------	2e	---	30.0	35.0	---	30.0
PimC:						
Piedmont----------------	3e	---	25.0	30.0	---	25.0
PIT:						
Pits--------------------	8s	---	---	---	---	---
PukA:						
Pulaski-----------------	5w	---	---	---	---	---
PulA:						
Pulaski-----------------	2w	70.0	45.0	40.0	20.0	30.0
RenB:						
Renfrow-----------------	2e	---	30.0	45.0	---	30.0
RinB:						
Renthin-----------------	2e	---	30.0	40.0	---	30.0

Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Grain sorghum	Oats	Soybeans	Wheat
		Bu	*Bu*	*Bu*	*Bu*	*Bu*
RnnB:						
Renthin-----------------	2e	---	30.0	40.0	---	30.0
RnnC2:						
Renthin-----------------	3e	---	25.0	30.0	---	20.0
RnUC:						
Renthin-----------------	3e	---	---	---	---	---
Urban land--------------	8s	---	---	---	---	---
SDGD4:						
Stephenville------------	6e	---	---	---	---	---
Darsil------------------	6e	---	---	---	---	---
Gullie land- -----------	8e	---	---	---	---	---
SDND:						
Stephenville------------	4e	---	---	---	---	---
Darsil------------------	6e	---	---	---	---	---
Newalla-----------------	4e	---	---	---	---	---
SDND2:						
Stephenville------------	4e	---	---	---	---	---
Darsil------------------	6e	---	---	---	---	---
Newalla-----------------	6e	---	---	---	---	---
StDC:						
Stephenville------------	3e	---	---	---	---	25.0
Darsil------------------	4e	---	---	---	---	15.0
StDC2:						
Stephenville------------	3e	---	---	---	---	---
Darsil------------------	4e	---	---	---	---	---
StLC4:						
Stephenville------------	6e	---	---	---	---	---
Littleaxe---------------	3e	---	---	---	---	---
SUND:						
Stephenville------------	4e	---	---	---	---	---
Urban land--------------	8s	---	---	---	---	---
Newalla-----------------	4e	---	---	---	---	---
TevD:						
Teval-------------------	4e	---	30.0	30.0	---	20.0
TevD2:						
Teval-------------------	4e	---	25.0	25.0	---	15.0
TlrB:						
Teller------------------	2e	---	40.0	45.0	---	30.0
TlrC:						
Teller------------------	3e	---	35.0	40.0	---	25.0

Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Grain sorghum	Oats	Soybeans	Wheat
		Bu	*Bu*	*Bu*	*Bu*	*Bu*
TlrC2:						
Teller------------------	3e	---	30.0	30.0	---	20.0
TlrD:						
Teller------------------	4e	---	30.0	30.0	---	20.0
TlUD:						
Teller------------------	4e	---	---	---	---	---
Urban land--------------	8s	---	---	---	---	---
TriA:						
Tribbey-----------------	5w	---	---	---	---	---
URB:						
Urban land--------------	8s	---	---	---	---	---
VanA:						
Vanoss------------------	1	---	45.0	55.0	---	40.0
VanB:						
Vanoss------------------	2e	---	40.0	50.0	---	40.0
W:						
Water.						
WauA:						
Waurika-----------------	3w	---	30.0	40.0	---	25.0
WtgA:						
Watonga-----------------	3w	80.0	45.0	50.0	25.0	30.0
WuUA:						
Watonga-----------------	3w	---	---	---	---	---
Urban land--------------	8s	---	---	---	---	---
YaGA:						
Yahola------------------	2w	---	45.0	40.0	---	35.0
Gaddy-------------------	3s	---	20.0	20.0	---	15.0
YahA:						
Yahola------------------	2w	70.0	45.0	40.0	20.0	35.0
YaUA:						
Yahola------------------	2e	---	---	---	---	---
Urban land--------------	8s	---	---	---	---	---
ZanB:						
Zaneis------------------	2e	---	40.0	40.0	---	35.0
ZanC:						
Zaneis------------------	3e	---	35.0	35.0	---	30.0
ZanC2:						
Zaneis------------------	3e	---	30.0	30.0	---	25.0
ZaUC:						
Zaneis------------------	3e	---	---	---	---	---
Urban land--------------	8s	---	---	---	---	---

Yields per Acre of Hay and Pasture

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Map symbol and soil name	Alfalfa hay	Improved bermudagrass	Introduced bluestem	Sorghum hay	Wheat grazeout
	Tons	*AUM**	*AUM**	*Tons*	*AUM**
AhpA:					
Ashport-----------------	5.0	8.5	6.5	7.5	5.2
AmbE:					
Amber-------------------	---	6.5	5.5	---	---
AshA:					
Asher-------------------	5.0	8.5	6.5	7.5	5.2
AspA:					
Ashport-----------------	5.0	8.5	6.5	7.5	5.2
AstA:					
Ashport-----------------	---	8.5	6.5	---	---
BetA:					
Bethany-----------------	---	6.0	6.0	7.0	5.2
BetB:					
Bethany-----------------	---	5.0	5.5	6.5	5.2
BeUB:					
Bethany.					
Urban land.					
CaaA:					
Canadian----------------	4.5	8.5	6.5	7.5	5.2
CaUB:					
Canadian.					
Urban land--------------					
CoIC2:					
Coyle-------------------	---	4.0	4.0	---	3.3
Ironmound---------------	---	2.0	2.0	---	2.0
CoUB:					
Coyle.					
Urban land.					
CoyB:					
Coyle-------------------	---	5.0	5.0	4.0	3.9
DalA:					
Dale--------------------	5.0	8.5	6.5	7.5	5.2
DAM:					
Dams.					

See footnote at end of table.

Yields per Acre of Hay and Pasture--Continued

Map symbol and soil name	Alfalfa hay	Improved bermudagrass	Introduced bluestem	Sorghum hay	Wheat grazeout
	Tons	*AUM**	*AUM**	*Tons*	*AUM**
DaUA:					
Dale.					
Urban land.					
DeDE:					
Derby	---	3.5	2.5	---	---
Dougherty	---	3.0	3.0	---	---
DerB:					
Derby	---	4.0	3.0	---	2.0
DerE:					
Derby	---	3.5	2.5	---	---
DleA:					
Dale	5.0	8.5	6.5	7.5	5.2
DSRG:					
Darsil	---	1.0	---	---	---
Stephenville	---	3.0	---	---	---
Rock outcrop.					
DUDE:					
Derby.					
Urban land.					
Dougherty.					
EasA:					
Easpur	5.0	8.5	6.5	7.5	5.2
GaGA:					
Gaddy	---	4.0	2.5	---	---
Gracemore	---	7.0	5.5	---	---
GcmA:					
Gracemont	---	9.0	5.5	---	---
GmtA:					
Gracemont	3.5	9.0	7.0	4.0	8.0
GraC:					
Grainola	---	3.5	4.0	1.5	2.0
GrAD:					
Grainola	---	2.5	3.5	---	---
Ashport	---	8.5	6.5	---	---
GrHC:					
Grant	---	5.0	5.0	5.5	4.6

See footnote at end of table.

Yields per Acre of Hay and Pasture--Continued

Map symbol and soil name	Alfalfa hay	Improved bermudagrass	Introduced bluestem	Sorghum hay	Wheat grazeout
	Tons	*AUM**	*AUM**	*Tons*	*AUM**
GrHC:					
Huska	---	3.0	2.5	2.0	2.0
Huska	---	3.0	2.5	2.0	2.0
GrIE:					
Grainola	---	2.5	3.0	---	---
Ironmound	---	2.0	2.5	---	---
GrPB2:					
Grainola	---	3.0	3.5	1.5	1.5
Piedmont	---	3.0	3.5	3.0	3.3
GrPC2:					
Grainola	---	3.0	3.5	1.5	1.5
Piedmont	---	3.0	3.5	2.5	2.6
GUIE:					
Grainola.					
Urban land.					
Ironmound.					
HarC:					
Harrah	---	4.0	4.0	5.5	3.9
HarC2:					
Harrah	---	3.5	3.5	4.5	3.3
HarC4:					
Harrah	---	2.0	2.0	---	---
HarG:					
Harrah.					
HaUC:					
Harrah.					
Urban land.					
HiLA:					
Hibsaw	---	5.0	---	---	1.5
Lomill	---	6.5	---	---	3.9
IrCE:					
Ironmound	---	2.0	2.5	---	---
Coyle	---	2.5	3.0	---	---
IrKD:					
Ironmound	---	2.0	2.5	---	1.5
Kingfisher	---	4.0	4.5	---	3.3

See footnote at end of table.

Yields per Acre of Hay and Pasture--Continued

Map symbol and soil name	Alfalfa hay	Improved bermudagrass	Introduced bluestem	Sorghum hay	Wheat grazeout
	Tons	*AUM**	*AUM**	*Tons*	*AUM**
KekA:					
Keokuk	5.0	8.5	6.5	7.5	5.2
KeoA:					
Keokuk	4.5	8.5	6.5	7.5	5.2
KeUA:					
Keokuk.					
Urban land.					
KgIC:					
Kingfisher	---	4.5	5.0	5.0	3.3
Ironmound	---	3.0	3.0	1.0	2.0
KowB:					
Konawa	---	4.5	4.0	5.5	3.9
KowD:					
Konawa	---	4.0	3.5	4.5	3.3
KowD2:					
Konawa	---	3.0	3.0	3.5	2.6
KowD4:					
Konawa	---	2.5	2.5	---	---
KrdA:					
Kirkland	---	4.0	5.5	6.0	4.6
KrUA:					
Kirkland.					
Urban land.					
KUIC:					
Kingfisher.					
Urban land.					
Ironmound.					
KwUD:					
Konawa.					
Urban land.					
LarA:					
Lawrie	5.0	8.5	6.5	7.5	5.2
LatG:					
Latrass	---	3.0	3.0	---	---
LawA:					
Lawrie	5.0	8.5	6.5	7.5	5.2
LitB:					
Littleaxe	---	5.0	5.0	5.0	3.9

See footnote at end of table.

Yields per Acre of Hay and Pasture--Continued

Map symbol and soil name	Alfalfa hay	Improved bermudagrass	Introduced bluestem	Sorghum hay	Wheat grazeout
	Tons	*AUM**	*AUM**	*Tons*	*AUM**
LitC:					
Littleaxe----------------	---	4.5	4.5	4.5	3.3
LitC2:					
Littleaxe----------------	---	4.5	4.5	3.5	2.6
LomA:					
Lomill-------------------	3.5	6.5	5.0	6.5	3.9
LtUC:					
Littleaxe.					
Urban land.					
LweA:					
Lawrie-------------------	5.0	8.5	6.5	7.5	5.2
LwfA:					
Lawrie-------------------	5.0	8.5	6.5	7.5	5.2
LwUA:					
Lawrie.					
Urban land.					
MlfA:					
Miller-------------------	3.5	7.0	6.0	6.5	3.9
MllA:					
Miller-------------------	3.5	6.5	5.0	6.5	3.9
M-W:					
Miscellaneous water.					
NewB:					
Newalla------------------	---	5.0	5.5	4.5	3.3
NewC2:					
Newalla------------------	---	3.5	4.0	---	2.0
NorB:					
Norge--------------------	---	5.0	5.0	6.5	5.2
NorC:					
Norge--------------------	---	5.0	5.5	6.0	4.6
NorC2:					
Norge--------------------	---	4.5	5.0	4.5	3.9
NoUC:					
Norge.					
Urban land.					
PdHC:					
Piedmont-----------------	---	3.5	4.5	4.5	3.9
Huska--------------------	---	3.0	2.5	2.0	2.6

See footnote at end of table.

Yields per Acre of Hay and Pasture--Continued

Map symbol and soil name	Alfalfa hay	Improved bermudagrass	Introduced bluestem	Sorghum hay	Wheat grazeout
	Tons	*AUM**	*AUM**	*Tons*	*AUM**
PieC2:					
Piedmont----------------	---	3.5	4.0	2.5	2.6
PimB:					
Piedmont----------------	---	4.0	4.5	5.0	3.9
PimC:					
Piedmont----------------	---	3.5	4.0	4.5	3.3
PIT:					
Pits.					
PukA:					
Pulaski-----------------	---	7.0	6.0	---	---
PulA:					
Pulaski-----------------	3.0	7.0	6.0	7.0	3.9
RenB:					
Renfrow-----------------	---	4.0	5.0	5.0	3.9
RinB:					
Renthin-----------------	---	4.0	5.0	5.0	3.9
RnnB:					
Renthin-----------------	---	4.0	5.0	5.0	3.9
RnnC2:					
Renthin-----------------	---	3.5	4.5	3.0	2.6
RnUC:					
Renthin.					
Urban land.					
SDGD4:					
Stephenville------------	---	3.0	2.0	---	---
Darsil------------------	---	1.5	1.0	---	---
Gullied land.					
SDND:					
Stephenville------------	---	3.5	3.5	---	---
Darsil------------------	---	2.0	2.0	---	---
Newalla-----------------	---	4.5	4.5	---	---
SDND2:					
Stephenville------------	---	3.0	3.0	---	---
Darsil------------------	---	1.5	1.5	---	---
Newalla-----------------	---	4.0	4.0	---	---
StDC:					
Stephenville------------	---	4.0	4.0	4.0	3.3

See footnote at end of table.

Yields per Acre of Hay and Pasture--Continued

Map symbol and soil name	Alfalfa hay	Improved bermudagrass	Introduced bluestem	Sorghum hay	Wheat grazeout
	Tons	*AUM**	*AUM**	*Tons*	*AUM**
StDC:					
Darsil------------------	---	2.5	2.5	2.0	2.0
StDC2:					
Stephenville------------	---	3.5	3.5	3.0	---
Darsil------------------	---	2.0	2.0	1.0	---
StLC4:					
Stephenville------------	---	3.0	3.0	---	---
Littleaxe---------------	---	4.5	4.5	---	---
SUND:					
Stephenville.					
Urban land.					
Newalla.					
TevD:					
Teval-------------------	---	4.5	4.5	4.5	2.6
TevD2:					
Teval-------------------	---	4.0	4.5	3.0	2.0
TlrB:					
Teller------------------	---	5.5	5.5	6.0	3.9
TlrC:					
Teller------------------	---	5.0	5.0	5.5	3.3
TlrC2:					
Teller------------------	---	4.5	5.0	5.0	2.6
TlrD:					
Teller------------------	---	4.5	4.5	4.5	2.6
TlUD:					
Teller.					
Urban land.					
TriA:					
Tribbey-----------------	---	7.0	3.0	---	---
URB:					
Urban land.					
VanA:					
Vanoss------------------	---	6.0	6.0	7.0	5.2
VanB:					
Vanoss------------------	---	5.0	5.5	6.5	5.2
W:					
Water.					

See footnote at end of table.

Yields per Acre of Hay and Pasture--Continued

Map symbol and soil name	Alfalfa hay	Improved bermudagrass	Introduced bluestem	Sorghum hay	Wheat grazeout
	Tons	*AUM**	*AUM**	*Tons*	*AUM**
WauA:					
Waurika	---	3.5	5.0	5.0	3.3
WtgA:					
Watonga	4.0	7.5	5.5	7.5	3.9
WuUA:					
Watonga.					
Urban land.					
YaGA:					
Yahola	3.5	7.0	5.5	7.0	4.6
Gaddy	1.5	5.0	4.0	2.0	2.0
YahA:					
Yahola	3.5	7.0	5.5	7.0	4.6
YaUA:					
Yahola.					
Urban land.					
ZanB:					
Zaneis	---	5.5	6.0	5.5	4.6
ZanC:					
Zaneis	---	5.0	5.5	5.0	3.9
ZanC2:					
Zaneis	---	4.5	5.0	4.0	3.3
ZaUC:					
Zaneis.					
Urban land.					

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

Cropland Limitations and Hazards

The management concerns affecting the use of the detailed map units in the survey area for crops are shown in the table "Cropland Limitations and Hazards." The main concerns in managing nonirrigated cropland are conserving moisture, controlling soil blowing and water erosion, and maintaining soil fertility and tilth.

Conserving moisture primarily involves reducing the evaporation and runoff rates and increasing the rate of water infiltration. Applying conservation tillage and conservation cropping systems, farming on the contour, stripcropping, establishing field windbreaks, and leaving crop residue on the surface conserve moisture.

Generally, a combination of several practices is needed to control *soil blowing* and *water erosion*. Conservation tillage, stripcropping, field windbreaks, tall grass barriers, contour farming, conservation cropping systems, crop residue management, diversions, and grassed waterways help to prevent excessive soil loss.

Measures that are effective in maintaining *soil fertility* include applying fertilizer, both organic and inorganic, including manure; incorporating crop residue or green manure crops into the soil; and using proper crop rotations. Controlling erosion helps to prevent the loss of organic matter and plant nutrients and thus helps to maintain productivity, although the level of fertility can be reduced even in areas where

erosion is controlled. All soils used for nonirrigated crops respond well to applications of fertilizer.

On irrigated soils the main management concerns are *efficient water use, nutrient management, control of erosion, soil tilth, pest and weed control,* and *timely planting and harvesting* for a successful crop. An irrigation system that provides optimum control and distribution of water at minimum cost is needed. Overirrigation wastes water, leaches plant nutrients, and causes erosion. Also, it can create drainage problems, raise the water table, and increase soil salinity.

Some of the limitations and hazards shown in the table cannot be easily overcome. These are *channels, flooding, depth to bedrock, ponding, gullies,* and *lack of timely precipitation*.

Additional limitations and hazards are as follows:

Areas of rock outcrop and oil waste land.—Farming around these areas may be feasible. Subsoiling or deep ripping soft sedimentary beds increases the effective rooting depth and the rate of water infiltration.

Excessive permeability.—This limitation causes deep leaching of nutrients and pesticides. The capacity of the soil to retain moisture for plant use is poor.

Potential for ground-water pollution.—This is a hazard in soils with excessive permeability, hard bedrock, or a water table within the profile.

Lime content, limited available water capacity, poor tilth, restricted permeability, and *surface crusting.*—The adverse effects of these limitations can be reduced by incorporating green manure crops, manure, or crop residue into the soil; applying a system of conservation tillage; and using conservation cropping systems. Also, crops may respond well to additions of phosphate fertilizer on soils that have a high content of lime.

Surface rock fragments.—This limitation causes rapid wear of tillage equipment. It cannot be easily overcome.

Slope.—Where the slope is more than 8 percent, water erosion and soil blowing may be accelerated unless conservation farming practices are applied.

Surface stones.—Stones or boulders on the surface can hinder normal tillage unless they are removed.

Salt and sodium content.—In areas where this is a limitation, only salt- and sodium-tolerant crops should be grown.

Criteria for Limitations and Hazards

Following is an explanation of the criteria used to determine the limitations or hazards.

Areas of rock outcrop.—Rock outcrop is a named component of the map unit.

Areas of rubble land.—Rubble land is a named component of the map unit.

Areas of oil waste land.—Oil waste land is a named component of the map unit.

Channeled.—The word “channeled” is included in the name of the map unit.

Depth to rock.—Bedrock is within a depth of 40 inches.

Water erosion.—The surface K factor multiplied by the upper slope limit is more than 2 (same as prime farmland criteria).

Excessive permeability.—The upper limit of the permeability range is 6 inches or more within the soil profile.

Flooding.—The component of the map unit is occasionally flooded or frequently flooded.

Gullied.—The word “gullied” is included in the name of the map unit.

Lime content.—The surface layer has more than 5 percent calcium carbonate equivalent or a WEG of 4L.

Limited available water capacity.—The available water capacity calculated to a depth of 60 inches or to a root-limiting layer is 6 inches or less.

Ponding.—A ponding duration is assigned to the component of the map unit.

Potential for ground-water pollution.—The soil has a water table within a depth of 4 feet or bedrock within 40 inches of the surface, or permeability is more than 2 inches per hour within the soil profile.

Poor tilth.—The component of the map unit has more than 35 percent clay in the surface layer.

Restricted permeability.—Permeability is 0.06 inch per hour or less within the soil profile.

Salt content.—The component of the map unit has an electrical conductivity of more than 4 in the surface layer or more than 8 within a depth of 30 inches.

Slope.—The upper slope limit of the component of the map unit is more than 8 percent.

Sodium content.—The sodium adsorption ratio of the component of the map unit is more than 13 within a depth of 30 inches.

Soil blowing.—The wind erodibility group is 8 or more.

Surface rock fragments.—The terms describing the texture of the surface layer include any rock fragment modifier except for gravelly or channery.

Surface crusting.—The content of organic matter is less than 2 percent in the surface layer.

Surface stones.—The terms describing the texture of the surface layer include any stony or bouldery modifier, or the map unit is a stony or bouldery phase.

Water table.—The component of the map unit has a water table within a depth of 3 feet.

Cropland Limitations and Hazards

(See text for a description of the limitations and hazards listed in this table.)

Map symbol and component name	Cropland limitations and hazards
AhpA:	
Ashport	Flooding
AmbE:	
Amber	Water erosion Restricted permeability Slope
AshA:	
Asher	Water table Poor tilth
AspA:	
Ashport	Flooding
AstA:	
Ashport	Flooding
BeUB:	
Bethany	None
Urban land	Nonsoil material
BetA:	
Bethany	None
BetB:	
Bethany	None
CaUB:	
Canadian	Excessive permeability Ground-water pollution potential
Urban land	Nonsoil material
CaaA:	
Canadian	Excessive permeability Ground-water pollution potential
CoIC2:	
Coyle	Depth to bedrock Restricted permeability Limited available water capacity Areas of rock outcrop
Ironmound	Soil blowing Depth to bedrock Restricted permeability Ground-water pollution potential Limited available water capacity Areas of rock outcrop
CoUB:	
Coyle	Depth to bedrock Restricted permeability Limited available water capacity
Urban land	Nonsoil material

Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
CoyB:	
Coyle	Depth to bedrock Restricted permeability Limited available water capacity
DAM:	
Dams	Nonsoil material
DSRG:	
Darsil	Soil blowing Water erosion Depth to bedrock Excessive permeability Ground-water pollution potential Limited available water capacity Slope Areas of rock outcrop
Stephenville	Water erosion Depth to bedrock Excessive permeability Ground-water pollution potential Slope Areas of rock outcrop
Rock outcrop	Nonsoil material
DUDE:	
Derby	Water erosion Excessive permeability Ground-water pollution potential Slope
Urban land	Nonsoil material
Dougherty	Water erosion Ground-water pollution potential Slope
DaUA:	
Dale	None
Urban land	Nonsoil material
DalA:	
Dale	None
DeDE:	
Derby	Water erosion Excessive permeability Ground-water pollution potential Slope
Dougherty	Water erosion Ground-water pollution potential Slope
DerB:	
Derby	Excessive permeability Ground-water pollution potential
DerE:	
Derby	Water erosion Excessive permeability Ground-water pollution potential Slope

Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
DleA:	
Dale	None
EasA:	
Easpur	Flooding
GUIE:	
Grainola	Water erosion Depth to bedrock Restricted permeability Limited available water capacity Slope Lime content Poor tilth
Urban land	Nonsoil material
Ironmound	Water erosion Depth to bedrock Restricted permeability Limited available water capacity Slope
GaGA:	
Gaddy	Flooding Excessive permeability Ground-water pollution potential
Gracemore	Flooding Excessive permeability Ground-water pollution potential Water table
GcmA:	
Gracemont	Flooding Excessive permeability Restricted permeability Salt content Ground-water pollution potential Water table Poor tilth
GmtA:	
Gracemont	Flooding Excessive permeability Ground-water pollution potential Water table
GrAD:	
Grainola	Water erosion Depth to bedrock Restricted permeability Limited available water capacity Lime content Poor tilth
Ashport	Flooding
GrHC:	
Grant	Restricted permeability

Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
GrHC:	
Huska	Water erosion Restricted permeability Sodium content Salt content Limited available water capacity Water table Surface crusting Poor tilth
GrIE:	
Grainola	Water erosion Depth to bedrock Restricted permeability Limited available water capacity Slope Areas of rock outcrop
Ironmound	Soil blowing Water erosion Depth to bedrock Restricted permeability Ground-water pollution potential Limited available water capacity Slope Areas of rock outcrop
GrPB2:	
Grainola	Depth to bedrock Restricted permeability Limited available water capacity Poor tilth
Piedmont	Depth to bedrock Restricted permeability Limited available water capacity
GrPC2:	
Grainola	Depth to bedrock Restricted permeability Limited available water capacity Areas of rock outcrop Poor tilth
Piedmont	Water erosion Depth to bedrock Restricted permeability Limited available water capacity Areas of rock outcrop
GraC:	
Grainola	Depth to bedrock Restricted permeability Limited available water capacity
HaUC:	
Harrah	Ground-water pollution potential
Urban land	Nonsoil material
HarC:	
Harrah	Ground-water pollution potential
HarC2:	
Harrah	Ground-water pollution potential

Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
HarC4:	
Harrah	Ground-water pollution potential Gullied Ground-water pollution potential Gullied
HarG:	
Harrah	Water erosion Ground-water pollution potential Slope
HiLA:	
Hibsaw	Flooding Ponding Sodium content Salt content Ground-water pollution potential Water table Surface crusting
Lomill	Flooding Restricted permeability Ground-water pollution potential Water table Poor tilth
IrCE:	
Ironmound	Soil blowing Water erosion Depth to bedrock Restricted permeability Ground-water pollution potential Limited available water capacity Slope Areas of rock outcrop
Coyle	Water erosion Depth to bedrock Restricted permeability Limited available water capacity Slope Areas of rock outcrop
IrKD:	
Ironmound	Water erosion Depth to bedrock Restricted permeability Limited available water capacity Areas of rock outcrop
Kingfisher	Water erosion Depth to bedrock Restricted permeability Areas of rock outcrop
KUIC:	
Kingfisher	Depth to bedrock Restricted permeability Limited available water capacity
Urban land	Nonsoil material
Ironmound	Depth to bedrock Restricted permeability Limited available water capacity

Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
KeUA:	
Keokuk	None
Urban land	Nonsoil material
KekA:	
Keokuk	None
KeoA:	
Keokuk	Flooding
KgIC:	
Kingfisher	Depth to bedrock Restricted permeability Limited available water capacity Areas of rock outcrop
Ironmound	Depth to bedrock Restricted permeability Limited available water capacity Areas of rock outcrop
KowB:	
Konawa	Ground-water pollution potential
KowD:	
Konawa	Ground-water pollution potential
KowD2:	
Konawa	Ground-water pollution potential
KowD4:	
Konawa	Ground-water pollution potential Gullied Ground-water pollution potential Gullied
KrUA:	
Kirkland	Restricted permeability Sodium content
Urban land	Nonsoil material
KrdA:	
Kirkland	Restricted permeability
KwUD:	
Konawa	Ground-water pollution potential
Urban land	Nonsoil material
LarA:	
Lawrie	Flooding
LatG:	
Latrass	Soil blowing Water erosion Excessive permeability Restricted permeability Ground-water pollution potential Slope Poor tilth
LawA:	
Lawrie	None

Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
LitB:	
Littleaxe	Ground-water pollution potential
LitC:	
Littleaxe	Ground-water pollution potential
LitC2:	
Littleaxe	Ground-water pollution potential
LomA:	
Lomill	Flooding Restricted permeability Ground-water pollution potential Water table Poor tilth
LtUC:	
Littleaxe	Ground-water pollution potential
Urban land	Nonsoil material
LwUA:	
Lawrie	None
Urban land	Nonsoil material
LweA:	
Lawrie	Flooding Poor tilth
LwfA:	
Lawrie	Flooding Ground-water pollution potential
MlfA:	
Miller	Flooding Restricted permeability Ground-water pollution potential Water table
MllA:	
Miller	Flooding Restricted permeability Water table Poor tilth
M-W:	
Miscellaneous water	Nonsoil material
NewB:	
Newalla	Restricted permeability Water table
NewC2:	
Newalla	Restricted permeability Water table
NoUC:	
Norge	None
Urban land	Nonsoil material
NorB:	
Norge	None

Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
NorC:	
Norge	None
NorC2:	
Norge	None
PIT:	
Pits	Nonsoil material
PdHC:	
Piedmont	Depth to bedrock Restricted permeability Limited available water capacity
Huska	Water erosion Restricted permeability Sodium content Salt content Limited available water capacity Water table Surface crusting Poor tilth
PieC2:	
Piedmont	Water erosion Depth to bedrock Restricted permeability Limited available water capacity Poor tilth
PimB:	
Piedmont	Depth to bedrock Restricted permeability Limited available water capacity Poor tilth
PimC:	
Piedmont	Water erosion Depth to bedrock Restricted permeability Limited available water capacity Poor tilth
PukA:	
Pulaski	Flooding Ground-water pollution potential
PulA:	
Pulaski	Flooding Ground-water pollution potential
RenB:	
Renfrow	Restricted permeability
RinB:	
Renthin	Restricted permeability Poor tilth
RnUC:	
Renthin	Water erosion Restricted permeability
Urban land	Nonsoil material
RnnB:	
Renthin	Restricted permeability

Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
RnnC2:	
Renthin	Water erosion Restricted permeability
SDGD4:	
Stephenville	Soil blowing Depth to bedrock Ground-water pollution potential Limited available water capacity Gullied Soil blowing Depth to bedrock Ground-water pollution potential Limited available water capacity Gullied
Darsil	Soil blowing Depth to bedrock Excessive permeability Ground-water pollution potential Limited available water capacity Gullied Soil blowing Depth to bedrock Excessive permeability Ground-water pollution potential Limited available water capacity Gullied
Gullied land	Nonsoil material
SDND:	
Stephenville	Depth to bedrock Excessive permeability Ground-water pollution potential Limited available water capacity Areas of rock outcrop
Darsil	Soil blowing Depth to bedrock Excessive permeability Ground-water pollution potential Limited available water capacity Areas of rock outcrop
Newalla	Water erosion Restricted permeability Water table Areas of rock outcrop
SDND2:	
Stephenville	Depth to bedrock Ground-water pollution potential Limited available water capacity Areas of rock outcrop
Darsil	Soil blowing Depth to bedrock Excessive permeability Ground-water pollution potential Limited available water capacity Areas of rock outcrop

Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
SDND2:	
Newalla	Water erosion Restricted permeability Water table Areas of rock outcrop
SUND:	
Stephenville	Depth to bedrock Excessive permeability Ground-water pollution potential Limited available water capacity
Urban land	Nonsoil material
Newalla	Water erosion Restricted permeability Water table
StDC:	
Stephenville	Depth to bedrock Excessive permeability Ground-water pollution potential Limited available water capacity
StDC:	
Darsil	Soil blowing Depth to bedrock Excessive permeability Ground-water pollution potential Limited available water capacity
StDC2:	
Stephenville	Depth to bedrock Ground-water pollution potential Limited available water capacity
Darsil	Soil blowing Depth to bedrock Excessive permeability Ground-water pollution potential Limited available water capacity
StLC4:	
Stephenville	Soil blowing Depth to bedrock Ground-water pollution potential Limited available water capacity Gullied Soil blowing Depth to bedrock Ground-water pollution potential Limited available water capacity Gullied
Littleaxe	Ground-water pollution potential Gullied Ground-water pollution potential Gullied
TevD:	
Teval	Water erosion Excessive permeability Ground-water pollution potential

Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
TevD2:	
Teval	Water erosion Excessive permeability Ground-water pollution potential
TlUD:	
Teller	Ground-water pollution potential
Urban land	Nonsoil material
TlrB:	
Teller	Ground-water pollution potential
TlrC:	
Teller	Ground-water pollution potential
TlrC2:	
Teller	Ground-water pollution potential
TlrD:	
Teller	Water erosion Ground-water pollution potential
TriA:	
Tribbey	Flooding Ground-water pollution potential Water table
URB:	
Urban land	Nonsoil material
VanA:	
Vanoss	None
VanB:	
Vanoss	None
W:	
Water	Nonsoil material
WauA:	
Waurika	Restricted permeability Ground-water pollution potential Water table
WtgA:	
Watonga	Restricted permeability Water table Poor tilth
WuUA:	
Watonga	Restricted permeability Water table Poor tilth
Urban land	Nonsoil material
YaGA:	
Yahola	Flooding Ground-water pollution potential
Gaddy	Flooding Excessive permeability Ground-water pollution potential
YaUA:	
Yahola	Ground-water pollution potential

Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
YaUA:	
Urban land	Nonsoil material
YahA:	
Yahola	Flooding Ground-water pollution potential
ZaUC:	
Zaneis	Restricted permeability
Urban land	Nonsoil material
ZanB:	
Zaneis	None
ZanC:	
Zaneis	None
ZanC2:	
Zaneis	Restricted permeability

Prime Farmland

Prime farmland is of major importance in meeting the Nation’s short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation’s prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. An adequate moisture supply and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources, and farming these soils results in the least damage to the environment (USDA, 2002).

Prime farmland soils may presently be used as cropland, pasture, rangeland, or woodland or for other purposes. They either are used for food and fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites; sites for institutions or public buildings; small parks; golf courses; cemeteries; railroad yards; airports; sanitary landfills; sewage treatment plants; and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils commonly receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable, and the level of acidity or alkalinity and the content of salts and sodium are acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods, and they are not frequently flooded during the growing season or are protected from flooding. Slopes range from 0 to 8 percent. More information about the criteria for prime farmland can be obtained at the local office of the Natural Resources Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

About 123,000 acres in the survey area, or nearly 27 percent of total acreage, meets the requirements for prime farmland. The map units in the survey area that meet these requirements are listed in the table “Prime Farmland.” The location of each map unit is shown on the detailed soil maps. The soil qualities that affect use and management are described in the sections “Soil Series” and “Detailed Soil Map Units” in Part I of this publication. This list does not constitute a recommendation for a particular land use.

Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland.)

Map symbol	Soil name
AhpA	Ashport silty clay loam, 0 to 1 percent slopes, occasionally flooded
AshA	Asher silty clay loam, 0 to 1 percent slopes, rarely flooded
AspA	Ashport silt loam, 0 to 1 percent slopes, occasionally flooded
BetA	Bethany silt loam, 0 to 1 percent slopes
BetB	Bethany silt loam, 1 to 3 percent slopes
CaaA	Canadian fine sandy loam, 0 to 1 percent slopes, rarely flooded
CoyB	Coyle loam, 1 to 3 percent slopes
DalA	Dale silt loam, 0 to 1 percent slopes, rarely flooded
DleA	Dale silty clay loam, 0 to 1 percent slopes, rarely flooded
EasA	Easpur loam, 0 to 1 percent slopes, occasionally flooded
HarC	Harrah fine sandy loam, 3 to 5 percent slopes
KekA	Keokuk very fine sandy loam, 0 to 1 percent slopes, rarely flooded
KeoA	Keokuk very fine sandy loam, 0 to 1 percent slopes, occasionally flooded
KowB	Konawa fine sandy loam, 1 to 3 percent slopes
KrdA	Kirkland silt loam, 0 to 1 percent slopes
LarA	Lawrie silt loam, 0 to 1 percent slopes, occasionally flooded
LawA	Lawrie loam, 0 to 1 percent slopes, rarely flooded
LitB	Littleaxe fine sandy loam, 1 to 3 percent slopes
LitC	Littleaxe fine sandy loam, 3 to 5 percent slopes
LweA	Lawrie silty clay loam, 0 to 1 percent slopes, occasionally flooded
LwfA	Lawrie fine sandy loam, 0 to 1 percent slopes, occasionally flooded
MlfA	Miller fine sandy loam, 0 to 1 percent slopes, occasionally flooded, overwash
MllA	Miller silty clay, 0 to 1 percent slopes, occasionally flooded
NewB	Newalla fine sandy loam, 1 to 3 percent slopes
NorB	Norge silt loam, 1 to 3 percent slopes
NorC	Norge silt loam, 3 to 5 percent slopes
PimB	Piedmont silt loam, 1 to 3 percent slopes
PimC	Piedmont silt loam, 3 to 5 percent slopes
PulA	Pulaski fine sandy loam, 0 to 1 percent slopes, occasionally flooded
RenB	Renfrow silt loam, 1 to 3 percent slopes
RinB	Renthin silt loam, 1 to 3 percent slopes
RnnB	Renthin silty clay loam, 1 to 3 percent slopes
TlrB	Teller fine sandy loam, 1 to 3 percent slopes
TlrC	Teller fine sandy loam, 3 to 5 percent slopes
VanA	Vanoss silt loam, 0 to 1 percent slopes
VanB	Vanoss silt loam, 1 to 3 percent slopes
WtgA	Watonga silty clay, 0 to 1 percent slopes, rarely flooded
YahA	Yahola fine sandy loam, 0 to 1 percent slopes, occasionally flooded
ZanB	Zaneis loam, 1 to 3 percent slopes
ZanC	Zaneis loam, 3 to 5 percent slopes

Range

Mark Moseley, range conservationist, Natural Resources Conservation Service, Stillwater, Oklahoma, helped prepare parts of this section.

Range, grazed forest land, and native pasture provide forage for livestock in the survey area.

Range is defined as land on which the native vegetation (the climax, or natural potential, plant community) is predominantly grasses, grasslike plants, forbs, and shrubs suitable for grazing and browsing. Range includes natural grasslands, savannas, many wetlands, some deserts, tundra, and areas of certain shrub and forb communities. Range receives no regular or frequent cultural treatment. The composition and production of the plant community are determined by soil, climate, topography, overstory canopy, and grazing management.

Grazed forest land is defined as land on which the understory includes, as an integral part of the forest plant community, plants that can be grazed without significant impairment of other forest values.

Native pasture is defined as land on which the potential (climax) vegetation is forest but which is used and managed primarily for the production of native forage plants. Native pasture includes cutover forest land and forest land that has been cleared and is managed for native or naturalized forage plants.

Range makes up about 24 percent of the land in Oklahoma County. It is mainly in the eastern part of the county. Planting areas of marginal cropland to a mixture of native grass species has been a recent trend, especially in the western part of the county. The range is used primarily for grazing by domestic cattle; however, it is becoming increasingly important as wildlife habitat as more landowners choose to lease hunting rights on their range and develop recreational activities for additional sources of income.

The range in Oklahoma County originally produced a wide variety of tall and mid grasses interspersed with an abundance of forbs. This plant community evolved under the collective influence of ungulate grazing, fire, variable climatic events, insects, and rodents and other wildlife. Effective range management practices that mimic the historical management can help to maintain or reestablish these high-quality plants.

Oklahoma County has five types of range. The first type is in the eastern part of the county, in areas where the soils are loamy and clayey and are shallow to very deep over sandstone or shale. These areas are typified by hills with narrow, very gently sloping to sloping, convex summits and shoulders and broad, sloping to steep backslopes and are deeply dissected by drainageways. The loamy soils support a mixture of post oak and blackjack savannah with an understory of mid and tall grasses, and the clayey soils support mid and tall grasses. The production potential is low or moderate.

The second type of range is in the western part of the county, in areas where the soils are clayey or loamy and are shallow to very deep over shale or sandstone. These areas are typified by hills with broad, nearly level to gently sloping, slightly convex summits, shoulders, and backslopes and are dissected by long and narrow drainageways. The soils support short to tall grasses and scattered woody shrubs and forbs. The production potential is low or moderate.

The third type of range is in areas in the central part of the county along the North Canadian River, in the northwestern part of the county along Deer and Bluff Creeks, and in the northeastern part of the county along the Deep Fork River. The soils in these areas are very deep and formed in sandy, loamy, or clayey alluvial sediments. The areas have level and nearly level flood plains and sloping to moderately steep escarpments. Wind erosion is a hazard on some of the soils unless adequate cover is maintained on the soil surface. The soils support mid and tall grasses and scattered woody shrubs and bottom-land hardwoods. The production potential is moderate to high.

The fourth type of range is in the eastern half of the central part of the county, parallel to the North Canadian River, and in a small area on the north side of the North Canadian River in the west-central part of the county. The soils are very deep and formed in eolian or terrace sediments. Areas of this type of range typically have nearly level to moderately steep dunes; very gently sloping to sloping, slightly convex or slightly concave terrace treads; and convex terrace risers that have been reworked by the wind. Wind

erosion is a hazard on some of the soils unless adequate cover is maintained on the soil surface. The soils support a mixture of oak savannah with an understory of mid and tall grasses. The production potential is low or moderate.

The last type of range is in the western half of the central part of the county, parallel to the North Canadian River, and in a small area on the north side of Deer Creek in the northwestern part of the county. The soils are very deep and formed in terrace sediments. Areas of this type of range typically have very gently sloping to sloping, slightly convex to slightly concave terrace treads and convex terrace risers. The soils support mid and tall grasses. The production potential is low or moderate.

Approximately 75 percent of the annual production of forage occurs in the months of April, May, June, and July, responding to spring and early summer rains. A second smaller growth period may occur in the fall if sufficient moisture is available.

The table "Rangeland Productivity and Characteristic Plant Communities" in this section shows, for each soil that supports vegetation suitable for grazing, the ecological site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. An explanation of the column headings in this table follows.

An *ecological site* is a distinctive kind of land with specific physical characteristics that make it different from other sites in its ability to produce a distinctive kind and amount of vegetation.

Many different ecological sites are in Oklahoma County. They are described in this section (pages 48 to 51). Over time, the combination of plants best suited to a particular soil and climate became dominant. If the soil is not excessively disturbed, this group of plants is the natural plant community for the site. Natural plant communities are not static but vary slightly from year to year and place to place.

The relationship between soils and vegetation was ascertained during this survey; thus, ecological sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important. The "Field Office Technical Guide," which is available at local offices of the Natural Resources Conservation Service, can provide specific information about ecological sites.

Total dry-weight production is the amount of vegetation that can be expected to grow annually on well managed rangeland. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruit of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are near the historical monthly average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Figure 10 shows typical growth curves for native vegetation and other kinds of forage. The growth curve for each kind of forage indicates the percentage of the total annual growth that occurs each month.

Dry weight is the total annual yield per acre of air-dry vegetation. Yields are adjusted to a percent of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as stage of maturity, exposure, amount of shade, recent rains, and unseasonable dry periods.

Characteristic vegetation consists of the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil. The plants are listed by common name. Under *composition,* the anticipated percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Similarity Index

Similarity index indicates, by percentages ranging from 1 to 100, the extent to which the present plant community resembles one of two other plant communities on an ecological site. A similarity index can be used to compare the present vegetation on an ecological site to the presumed historic vegetation for that site. This comparison provides a basis for ascertaining the extent and direction of changes that have differentiated the current vegetation from the historic vegetation. A similarity index of 70 would suggest that the present plant community has 70 percent of the presumed historic plant community for the site.

The management goal is not necessarily a present plant community that has a similarity index of 100 when compared to the historic plant community. A

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
IMPROVED BERMUDAGRASS				5	25	35	20	10	5			
WEEPING LOVEGRASS			3	20	25	20	15	6	11			
INTRODUCED BLUESTEM				3	15	26	22	18	10	1		
SMALL GRAIN GRAZEOUT	3	9	29	27	18				1	4	6	3
FORAGE SORGHUM						14	33	33	20			
NATIVE GRASS	1	1	2	10	20	27	16	8	5	2	2	1

Figure 10.—Typical growth curves for various kinds forage in Oklahoma County. The growth curve for each kind of forage indicates the percentage of the total annual growth that occurs each month.

similarity index can be used as a measure of how near the current plant community is to the goal of the landowner, that is, the percentage of the present plant community that resembles a desired plant community.

Abnormal disturbances that change the natural plant community include repeated overuse by livestock, excessive burning, erosion, and cultivation. Grazing animals select the most palatable plants. These plants will eventually die if they are continually grazed at a severity that does not allow for recovery. A very severe disturbance can completely destroy the natural plant community. Under these conditions, the less desirable plants, such as annuals and weedlike plants, can increase in abundance. If the plant community and the soils have not deteriorated significantly, the plant community eventually can return to predominantly natural plants if proper range management is applied.

Knowledge of the ecological site is necessary as a basis for planning and applying the management needed to maintain or improve the desired plant community for selected uses. Such information is needed to support or maintain management objectives, planned grazing systems, proper stocking rates, suitable wildlife management practices, recreational uses, and the condition of watersheds.

Range Management

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the similarity index.

Effective range management conserves rainfall, enhances water quality, reduces the hazard of downstream flooding, improves yields, provides forage for livestock and wildlife, enhances recreational opportunities, and protects the soil. The main management concern is recognizing important changes in the plant cover or the range trend. These changes takes place gradually and can be overlooked.

Each range manager should evaluate the type of plant community that best supports the ranch and then

apply management and ecological principles to achieve the goals. The desired plant community should be within the capabilities of the land.

The primary range management practices used in Oklahoma County include prescribed grazing, stock-water developments, and fences. If undesirable plants become dominant, range seeding, brush management, or prescribed burning are commonly used.

Range management includes four major considerations:

1. *Proper grazing distribution,* which is achieved by managing livestock so that all parts of the grazing unit are grazed equally.
2. *Selective grazing,* which occurs because animals graze preferred plants to balance their diets. If selective grazing occurs repeatedly, the preferred plants are damaged.
3. *A proper stocking rate,* which is achieved by balancing animal numbers with forage production.
4. *Rest periods* during which grazed plants are given enough rest to recover and to maintain their growth.

It is important to remember that forage production is controlled by rainfall while composition is determined by grazing management.

Setting stocking rates is not an exact science because there are influences from grazing management systems, season of use, mix of livestock, and seasonal forage production. Some rules of thumb, however, can be helpful. To maintain a nutritional cover of plants, about 50 percent of the annual growth of the key, or most important, grazing plants should remain at the end of the grazing season. Plants can be removed not only through grazing by livestock but also through grazing by rodents, insects, and wildlife and through the deterioration caused by climatic variations. Because of these factors, a safe initial stocking rate for livestock should be calculated on the basis of 25 percent of the total annual growth, by weight, of the vegetation.

For example, production could be 3,500 pounds per acre of air-dry grasses, forbs, and limited woody species during an average season on a Loamy Prairie ecological site where the similarity index between the present plant community and the historic plant community is more than 70 percent. Twenty-five percent of this production is 875 pounds per acre.

A 1,000-pound cow with her calf is equivalent to one animal unit (AU) and will consume about 2.6 percent of her body weight (26 pounds) of forage per day. So, in 1 month, an animal unit will consume 790 pounds of native vegetation, depending on the quality and stage of growth of the plants (26 pounds per day times 365 days per year divided by 12 months per year).

Dividing 875 pounds (forage allocation) by 26 pounds (forage required per day for one animal unit) suggests that 1 acre of the Loamy Prairie ecological site with a similarity index of 70 will feed one cow for 33.6 days. To convert forage available from 1 acre to an animal unit month (AUM), the available forage (875 pounds) is divided by the amount required to feed an animal unit for 1 month (790 pounds). One acre will provide 1.1 AUM of grazing. Therefore, 10.9 acres will feed one cow for 12 months in this example. Another approach is to calculate the annual forage needs of an animal unit (790 pounds per month times 12 months equals 9,490 pounds). Dividing the 875 pounds of usable forage per acre into the 9,490 pounds needed by the cow reveals that approximately 10.9 acres is needed for one cow annually. Stocking rate calculation should be adjusted for animal size, grazing system, and grazing season.

More information about planning a grazing program is available from the local office of the Natural Resources Conservation Service.

Ecological Sites

The following paragraphs describe the ecological sites in Oklahoma County.

080AY010OK, Claypan Prairie (north).—This site is in areas of nearly level to gently sloping, deep, loamy soils on uplands (fig.11). These soils have a dense, clayey subsoil that absorbs water slowly and restricts root penetration. Under good management, the important plants are little bluestem, switchgrass, leadplant, and perennial sunflowers. Continued abuse will result in an increase in the abundance of sideoats grama, blue grama, tall dropseed, wild alfalfa, and buckbrush. Forage production is moderate.

080AY045OK, Heavy Bottomland.—This site is in areas of nearly level and very gently sloping, deep, clayey soils on flood plains. These soils absorb water slowly. Large cracks are common during periods of drought. Under good management, the important plants are big bluestem, indiangrass, prairie cordgrass, switchgrass, and perennial sunflowers. Continued abuse will result in an increase in the abundance of tall dropseed, goldenrods, sedges, and persimmon. Forage production is moderate.

080AY050OK, Loamy Bottomland.—This site is in areas of nearly level to sloping, very deep, loamy soils on flood plains or terraces. Under good management, the important plants are big bluestem, indiangrass, eastern gamagrass, compassplant, and switchgrass. Continued abuse will result in an increase in the

Figure 11.—An area of Renfrow silt loam, 1 to 3 percent slopes, which is in the Claypan Prairie (north) ecological site.

abundance of beaked panicum, tall dropseed, heath aster, sedges, elm, and greenbrier. Forage production is high.

080AY056OK, Loamy Prairie.—This site is in areas where the climax vegetation is primarily little bluestem, big bluestem, indiangrass, and switchgrass (fig. 12). Along with Canada wildrye, these plants make up about 70 percent of the vegetation. Under continuous heavy grazing, the principal grasses are sideoats grama and blue grama. Leadplant, wild indigo, scurfpea, and prairie acacia are common legumes.

080AY068OK, Sandy Bottomland.—This site is in areas of nearly level and very gently sloping, deep, sandy soils on flood plains or terraces. These soils are droughty and are subject to wind erosion. Under good management, the important plants are switchgrass, sand bluestem, indiangrass, and perennial sunflowers. Continued abuse will result in an increase in the abundance of beaked panicum, Texas bluegrass, goldenrods, willow, and cottonwood. Forage production is low.

080AY073OK, Sandy Prairie.—This site is in areas of very gently sloping to undulating, very deep, moderately sandy soils on uplands. These soils are highly productive and have a moderate water-holding capacity. Under good management, the important plants are sand bluestem, little bluestem, and indiangrass. Continued abuse will result in an increase in the abundance of sideoats grama, blue grama, and sand dropseed.

080AY083OK, Shallow Prairie.—This site is in areas where the potential plant community is a tall grass aspect. Species composition, by weight, is 75 percent grasses, 20 percent forbs, and 5 percent woody plants. Big bluestem, indiangrass, switchgrass, little bluestem, tephrosia, catclaw sensitivebrier, perennial sunflowers, and skunkbush are preferred plants. They make up 65 percent of the livestock forage production when the site is in excellent condition. Under continuous heavy grazing, they are replaced by less palatable plants, such as dropseeds, jointtail, Scribner panicum, buffalograss, wild indigo, milkweeds, sagewort, sumacs, and indigobush. As the

Figure 12.—An area of Zaneis loam, 1 to 3 percent slopes, which is in the Loamy Prairie ecological site.

site deteriorates, other plants, such as broomsedge bluestem, splitbeard bluestem, Japanese brome, showy partridge pea, common broomweed, ragweeds, bitter sneezeweed, crotons, persimmon, and hawthorn, dominate the site.

080AY091OK, Slickspot.—This site is in areas of gently sloping, deep, loamy soils on uplands. These soils have a clayey, blocky, alkali subsoil. Forage production is low because of a slow water intake rate, the content of salts, and poor aeration. Under good management, the important plants are alkali sacaton, switchgrass, western wheatgrass, tall dropseed, white tridens, and blue grama, which make up 50 percent of the vegetation. Other plants include dotted gayfeather, whorled dropseed, gummy lovegrass, fall witchgrass, yellow neptunia, mourning lovegrass, purple threeawn, curlycup gumweed, goldenweed, and hairy goldaster. Abuse will result in an increase in the abundance of blue grama, silver bluestem, wild alfalfa, lanceleaf ragweed, threeawn, and western ragweed.

080AY095OK, Subirrigated.—This site is in areas of deep, nearly level and very gently sloping, sandy soils on uplands or flood plains. These soils have a high water table that is beneficial to plant growth. Under good management, the important plants are switchgrass, big bluestem, indiangrass, and eastern gamagrass. Abuse will result in an increase in the abundance of tall dropseed, sideoats grama, sedges, willow, and cottonwood. This is a highly productive site.

080AY810OK, Reseeded Claypan Prairie.—This site is in formerly cultivated areas that typically are seeded to sideoats grama, blue grama, little bluestem, sand bluestem, and indiangrass. The site may have been damaged by erosion and is low in inherent fertility. If abused, the site will deteriorate to broomweeds and threeawn.

080AY856OK, Reseeded Loamy Prairie.—This site is in areas where the plant cover includes big bluestem, switchgrass, little bluestem, indiangrass, and other seeded species. Native legumes can be abundant. Other important grasses include jointtail, meadow dropseed, tall dropseed, and hairy grama. Forage production is much lower than that on the

Loamy Prairie site because of lower quality of soil health.

080AY873OK, Reseeded Sandy Prairie.—This site is in areas where the main reseeded species are little bluestem, big bluestem, indiangrass, and switchgrass. Sideoats grama also grows on the site. If not carefully managed, the site will deteriorate to ragweeds, threeawns, and other annuals. Forage production is limited by low fertility.

080AY883OK, Reseeded Shallow Prairie.—This site is in areas where seeded grasses include sideoats grama and mixtures of native bluestems. If grazing abuse occurs, the dominant plants are hairy grama, buffalograss, dropseed, silver bluestem, cheatgrass, broomweed, western ragweed, and other weedy grasses and forbs. Because of past use and erosion, this is not a productive site.

084AY018OK, Deep Sand Savannah.—This site is in areas of very gently sloping to moderately steep, deep, sandy soils on uplands. Under good management, the important plants are an overstory of post oak and blackjack oak and an understory of big bluestem, sand lovegrass, and switchgrass. The trees can occur in both dense stands and scattered stands. As the stands become more dense, herbaceous vegetation decreases in abundance. Abuse will result in an increase in the abundance of tall dropseed, purpletop, Scribner panicum, heath aster, white snakeroot, splitbeard bluestem, broomsedge bluestem, winged elm, hickory, buckbrush, sumac, and shrubby oak. The abundance of eastern redcedar can increase with lack of fire.

084AY050OK, Loamy Bottomland.—This site is in areas where the pristine plant community consists of tall grasses. Species composition, by weight, is 70 percent grasses, 20 percent forbs, and 10 percent woody plants. Eastern gamagrass, Florida paspalum, prairie cordgrass, big bluestem, indiangrass, switchgrass, switchcane, leadplant, Illinois bundleflower, compassplant, gayfeather, and passion vine make up about 75 percent of the forage when the site is in top ecological condition. Under heavy grazing, these plants are replaced by such plants as little bluestem, tall dropseed, Scribner panicum, sedges, rushes, wild indigo, perennial sunflowers, goldenrods, trumpetvine, winged elm, sumacs, and indigobush. If the site deteriorates, unpalatable plants, such as silver bluestem, splitbeard bluestem, broomsedge bluestem, sideoats grama, Japanese brome, threeawns, showy partridge pea, ragweeds, bitter sneezeweed, ironweed, white snakeroot, persimmon, hawthorn, post oak, and blackjack oak, dominate.

084AY076OK, Sandy Savannah (central).—This site is in areas where the decreaser grasses are little bluestem, indiangrass, big bluestem, and switchgrass. These grasses make up at least 45 percent of the total vegetation. Cool-season species include Canada wildrye, Virginia wildrye, Texas bluegrass, and flatsedge. Woody species include post oak, blackjack oak, hickory, ash, elm, bumelia, coralberry, persimmon, poison ivy, grape, and hackberry. These species do not exceed 20 percent of the total cover.

084AY089OK, Shallow Savannah.—This site is in areas of where 15 percent or more of the surface is covered with post oak, blackjack oak, and other scrub woody species of little commercial value. The principal grasses are little bluestem, big bluestem, switchgrass, indiangrass, and Canada wildrye. They make up 55 to 65 percent of the vegetation. The less dominant grasses are hairy grama, tall dropseed, and meadow dropseed. Invader plants include splitbeard bluestem, silver bluestem, eastern redcedar, and threeawn.

084AY095OK, Subirrigated.—This site is in areas of deep, nearly level and very gently sloping, sandy soils on uplands or flood plains. These soils have a high water table that is beneficial to plant growth. Under good management, the important plants are switchgrass, big bluestem, indiangrass, and eastern gamagrass. Continued abuse will result in an increase in the abundance of tall dropseed, sideoats grama, sedges, willow, and cottonwood. This is a highly productive site.

084AY876OK, Reseeded Sandy Savannah.—This site is in areas where former cropland typically is seeded to a mixture of big bluestem, little bluestem, indiangrass, switchgrass, sideoats grama, and other grasses. If the site is abused, these grasses are replaced by red lovegrass, gummy lovegrass, dropseeds, Scribner panicum, fall witchgrass, wild buckwheat, ragweed, and sandbur.

084AY889OK, Reseeded Shallow Savannah.—This site is in areas where the principal seeded grasses are little bluestem, blue grama, and sideoats grama. Other grasses include big bluestem, indiangrass, and switchgrass. If the site deteriorates, such grasses as red lovegrass, mourning lovegrass, and splitbeard bluestem increase in abundance.

Rangeland Productivity and Characteristic Plant Communities

(Only the soils that support rangeland vegetation suitable for grazing are rated.)

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Composition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
AhpA:						
Ashport--------	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem------------------	25
					Miscellaneous perennial grasses	15
					Switchgrass-------------------	15
					Yellow Indiangrass------------	15
					Little bluestem---------------	10
					Miscellaneous perennial forbs--	10
					Eastern gramagrass------------	5
					Miscellaneous trees-----------	5
AmbE:						
Amber----------	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem------------------	25
					Miscellaneous perennial grasses	15
					Switchgrass-------------------	15
					Yellow Indiangrass------------	15
					Little bluestem---------------	10
					Miscellaneous perennial forbs--	10
					Eastern gramagrass------------	5
					Miscellaneous trees-----------	5
AshA:						
Asher----------	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem------------------	25
					Miscellaneous perennial grasses	15
					Switchgrass-------------------	15
					Yellow Indiangrass------------	15
					Little bluestem---------------	10
					Miscellaneous perennial forbs--	10
					Eastern gramagrass------------	5
					Miscellaneous trees-----------	5
AspA:						
Ashport--------	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem------------------	25
					Miscellaneous perennial grasses	15
					Switchgrass-------------------	15
					Yellow Indiangrass------------	15
					Little bluestem---------------	10
					Miscellaneous perennial forbs--	10
					Eastern gramagrass------------	5
					Miscellaneous trees-----------	5
AstA:						
Ashport--------	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem------------------	25
					Miscellaneous perennial grasses	15
					Switchgrass-------------------	15
					Yellow Indiangrass------------	15
					Little bluestem---------------	10
					Miscellaneous perennial forbs--	10
					Eastern gramagrass------------	5
					Miscellaneous trees-----------	5

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	Lb/acre	Lb/acre		Pct
BetA:						
Bethany	Loamy Prairie, 080AY056OK	5,500	3,850	2,750	Little bluestem	25
					Big bluestem	20
					Switchgrass	10
					Yellow Indiangrass	10
					Blue grama	5
					Miscellaneous perennial forbs	5
					Sideoats grama	5
					Tall dropseed	5
BetB:						
Bethany	Loamy Prairie, 080AY056OK	5,500	3,850	2,750	Little bluestem	25
					Big bluestem	20
					Switchgrass	10
					Yellow Indiangrass	10
					Blue grama	5
					Miscellaneous perennial forbs	5
					Sideoats grama	5
					Tall dropseed	5
BeUB:						
Bethany.						
Urban land.						
CaaA:						
Canadian	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem	25
					Miscellaneous perennial grasses	15
					Switchgrass	15
					Yellow Indiangrass	15
					Little bluestem	10
					Miscellaneous perennial forbs	10
					Eastern gamagrass	5
					Miscellaneous trees	5
CaUB:						
Canadian.						
Urban land.						
CoIC2:						
Coyle	Reseeded Loamy Prairie, 080AY856OK	3,300	2,300	1,650	---	---
Ironmound	Reseeded Shallow Prairie, 080AY883OK	2,000	1,400	1,000	---	---
CoUB:						
Coyle.						
Urban land.						
CoyB:						
Coyle	Loamy Prairie, 080AY056OK	5,500	3,850	2,750	Little bluestem	25
					Big bluestem	20
					Switchgrass	10
					Yellow Indiangrass	10
					Blue grama	5
					Miscellaneous perennial forbs	5
					Sideoats grama	5
					Tall dropseed	5

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	Lb/acre	Lb/acre		Pct
DalA:						
Dale-----------	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem------------------	25
					Miscellaneous perennial grasses	15
					Switchgrass--------------------	15
					Yellow Indiangrass-------------	15
					Little bluestem----------------	10
					Miscellaneous perennial forbs--	10
					Eastern gramagrass-------------	5
					Miscellaneous trees------------	5
DAM:						
Dams.						
DaUA:						
Dale.						
Urban land.						
DeDE:						
Derby----------	Deep Sand Savannah, 084AY018OK	4,000	2,800	2,000	Little bluestem----------------	25
					Big bluestem------------------	20
					Blackjack oak------------------	10
					Miscellaneous perennial grasses	10
					Post oak-----------------------	10
					Scribner panicum---------------	5
					Miscellaneous perennial forbs--	5
					Miscellaneous shrubs-----------	5
					Switchgrass--------------------	5
					Yellow Indiangrass-------------	5
Dougherty------	Deep Sand Savannah, 084AY018OK	4,000	2,800	2,000	Little bluestem----------------	25
					Big bluestem------------------	20
					Blackjack oak------------------	10
					Miscellaneous perennial grasses	10
					Post oak-----------------------	10
					Scribner panicum---------------	5
					Miscellaneous perennial forbs--	5
					Miscellaneous shrubs-----------	5
					Switchgrass--------------------	5
					Yellow Indiangrass-------------	5
DerB:						
Derby----------	Deep Sand Savannah, 084AY018OK	4,000	2,800	2,000	Little bluestem----------------	25
					Big bluestem------------------	20
					Blackjack oak------------------	10
					Miscellaneous perennial grasses	10
					Post oak-----------------------	10
					Scribner panicum---------------	5
					Miscellaneous perennial forbs--	5
					Miscellaneous shrubs-----------	5
					Switchgrass--------------------	5
					Yellow Indiangrass-------------	5

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
DerE:						
Derby	Deep Sand Savannah, 084AY018OK	4,000	2,800	2,000	Little bluestem	25
					Big bluestem	20
					Blackjack oak	10
					Miscellaneous perennial grasses	10
					Post oak	10
					Scribner panicum	5
					Miscellaneous perennial forbs	5
					Miscellaneous shrubs	5
					Switchgrass	5
					Yellow Indiangrass	5
DleA:						
Dale	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem	25
					Miscellaneous perennial grasses	15
					Switchgrass	15
					Yellow Indiangrass	15
					Little bluestem	10
					Miscellaneous perennial forbs	10
					Eastern gramagrass	5
					Miscellaneous trees	5
DSRG:						
Darsil	Shallow Savannah, 084AY089OK	3,200	2,100	1,400	Little bluestem	30
					Big bluestem	20
					Blackjack oak	10
					Miscellaneous perennial grasses	10
					Post oak	10
					Miscellaneous perennial forbs	5
					Miscellaneous shrubs	5
					Sideoats grama	5
					Yellow Indiangrass	5
Stephenville	Sandy Savannah (central), 084AY076OK	5,000	3,500	2,500	Little bluestem	25
					Big bluestem	20
					Blackjack oak	10
					Post oak	10
					Scribner panicum	5
					Miscellaneous perennial forbs	5
					Miscellaneous trees	5
					Purple lovegrass	5
					Purpletop tridens	5
					Sand lovegrass	5
					Switchgrass	5
Rock outcrop.						
DUDE:						
Derby.						
Urban land.						
Dougherty.						

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	Lb/acre	Lb/acre		Pct
EasA:						
Easpur----------	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem------------------	25
					Miscellaneous perennial grasses	15
					Switchgrass-------------------	15
					Yellow Indiangrass------------	15
					Little bluestem---------------	10
					Miscellaneous perennial forbs--	10
					Eastern gramagrass------------	5
					Miscellaneous trees-----------	5
GaGA:						
Gaddy-----------	Sandy Bottomland, 080AY068OK	3,800	2,700	2,000	Switchgrass-------------------	30
					Big bluestem------------------	15
					Yellow Indiangrass------------	15
					annual grasses----------------	10
					Texas bluegrass---------------	5
					Little bluestem---------------	5
					Miscellaneous perennial forbs--	5
					Miscellaneous perennial grasses	5
					Miscellaneous trees-----------	5
					Threeawn----------------------	5
Gracemore-------	Subirrigated, 080AY095OK	9,000	8,000	7,000	Yellow Indiangrass------------	30
					Miscellaneous perennial grasses	15
					Eastern gramagrass------------	10
					Sand bluestem-----------------	10
					Sedge-------------------------	10
					Miscellaneous shrubs----------	5
					Switchgrass-------------------	5
GcmA:						
Gracemont-------	Subirrigated, 080AY095OK	9,000	8,000	7,000	Yellow Indiangrass------------	30
					Miscellaneous perennial grasses	15
					Eastern gramagrass------------	10
					Sand bluestem-----------------	10
					Sedge-------------------------	10
					Miscellaneous shrubs----------	5
					Switchgrass-------------------	5
GmtA:						
Gracemont-------	Subirrigated, 080AY095OK	9,000	8,000	7,000	Yellow Indiangrass------------	30
					Miscellaneous perennial grasses	15
					Eastern gramagrass------------	10
					Sand bluestem-----------------	10
					Sedge-------------------------	10
					Miscellaneous shrubs----------	5
					Switchgrass-------------------	5
GraC:						
Grainola--------	Claypan Prairie (north), 080AY010OK	4,000	2,800	2,000	Little bluestem---------------	25
					Big bluestem------------------	20
					Switchgrass-------------------	15
					Yellow Indiangrass------------	10
					Blue grama--------------------	5
					Buffalograss------------------	5
					Sideoats grama----------------	5

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
GrAD:						
Grainola	Claypan Prairie (north), 080AY010OK	4,000	2,800	2,000	Little bluestem	25
					Big bluestem	20
					Switchgrass	15
					Yellow Indiangrass	10
					Blue grama	5
					Buffalograss	5
					Sideoats grama	5
Ashport	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem	25
					Miscellaneous perennial grasses	15
					Switchgrass	15
					Yellow Indiangrass	15
					Little bluestem	10
					Miscellaneous perennial forbs	10
					Eastern gramagrass	5
					Miscellaneous trees	5
GrHC:						
Grant	Loamy Prairie, 080AY056OK	5,500	3,850	2,750	Little bluestem	25
					Big bluestem	20
					Switchgrass	10
					Yellow Indiangrass	10
					Blue grama	5
					Miscellaneous perennial forbs	5
					Sideoats grama	5
					Tall dropseed	5
Huska	Slickspot, 080AY091OK	2,000	1,400	1,000	Alkali sacaton	15
					Miscellaneous perennial grasses	15
					Switchgrass	15
					Blue grama	10
					Sideoats grama	10
					Tall dropseed	10
					Scribner panicum	5
					dotted gayfeather	5
					Miscellaneous perennial forbs	5
					Silver bluestem	5
					whorled dropseed	5
GrIE:						
Grainola	Claypan Prairie (north), 080AY010OK	4,000	2,800	2,000	Little bluestem	25
					Big bluestem	20
					Switchgrass	15
					Yellow Indiangrass	10
					Blue grama	5
					Buffalograss	5
					Sideoats grama	5
Ironmound	Shallow Prairie, 080AY083OK	3,000	2,100	1,500	Little bluestem	30
					Sideoats grama	15
					Big bluestem	10
					Blue grama	10
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Buffalograss	5
					Sand dropseed	5
					Threeawn	5

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
GrPB2:						
Grainola-------	Reseeded Claypan Prairie, 080AY810OK	3,300	2,300	1,600	---	---
Piedmont-------	Reseeded Claypan Prairie, 080AY810OK	3,300	2,300	1,600	---	---
GrPC2:						
Grainola-------	Reseeded Claypan Prairie, 080AY810OK	3,300	2,300	1,600	---	---
Piedmont-------	Reseeded Claypan Prairie, 080AY810OK	3,300	2,300	1,600	---	---
GUIE:						
Grainola.						
Urban land.						
Ironmound.						
HarC:						
Harrah---------	Sandy Savannah (central), 084AY076OK	5,000	3,500	2,500	Little bluestem----------------	25
					Big bluestem-------------------	20
					Blackjack oak------------------	10
					Post oak-----------------------	10
					Scribner panicum---------------	5
					Miscellaneous perennial forbs--	5
					Miscellaneous trees------------	5
					Purple lovegrass---------------	5
					Purpletop tridens--------------	5
					Sand lovegrass-----------------	5
					Switchgrass--------------------	5
HarC2:						
Harrah---------	Reseeded Sandy Savannah, 084AY876OK	2,700	1,900	1,300	---	---
HarC4:						
Harrah---------	Reseeded Sandy Savannah, 084AY876OK	2,700	1,900	1,300	---	---
HarG:						
Harrah---------	Sandy Savannah (central), 084AY076OK	5,000	3,500	2,500	Little bluestem----------------	25
					Big bluestem-------------------	20
					Blackjack oak------------------	10
					Post oak-----------------------	10
					Scribner panicum---------------	5
					Miscellaneous perennial forbs--	5
					Miscellaneous trees------------	5
					Purple lovegrass---------------	5
					Purpletop tridens--------------	5
					Sand lovegrass-----------------	5
					Switchgrass--------------------	5
HaUC:						
Harrah.						
Urban land.						

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
HiLA:						
Hibsaw	Slickspot, 080AY091OK	2,000	1,400	1,000	Alkali sacaton	15
					Miscellaneous perennial grasses	15
					Switchgrass	15
					Blue grama	10
					Sideoats grama	10
					Tall dropseed	10
					Scribner panicum	5
					Dotted gayfeather	5
					Miscellaneous perennial forbs	5
					Silver bluestem	5
					Whorled dropseed	5
Lomill	Heavy Bottomland, 080AY045OK	5,500	3,700	2,500	Switchgrass	15
					Blue grama	10
					Meadow dropseed	10
					Miscellaneous perennial grasses	10
					Sideoats grama	10
					Western wheatgrass	10
					Canada wildrye	5
					Alkali sacaton	5
					Buffalograss	5
					Fourwing saltbush	5
					Miscellaneous perennial forbs	5
					Prairie,cordgrass	5
					Vine mesquite	5
IrCE:						
Ironmound	Shallow Prairie, 080AY083OK	3,000	2,100	1,500	Little bluestem	30
					Sideoats grama	15
					Big bluestem	10
					Blue grama	10
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Buffalograss	5
					Sand dropseed	5
					Threeawn	5
Coyle	Loamy Prairie, 080AY056OK	5,500	3,850	2,750	Little bluestem	25
					Big bluestem	20
					Switchgrass	10
					Yellow Indiangrass	10
					Blue grama	5
					Miscellaneous perennial forbs	5
					Sideoats grama	5
					Tall dropseed	5
IrKD:						
Ironmound	Shallow Prairie, 080AY083OK	3,000	2,100	1,500	Little bluestem	30
					Sideoats grama	15
					Big bluestem	10
					Blue grama	10
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Buffalograss	5
					Sand dropseed	5
					Threeawn	5

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
IrKD:						
Kingfisher-----	Loamy Prairie, 080AY056OK	5,500	3,850	2,750	Little bluestem----------------	25
					Big bluestem-------------------	20
					Switchgrass--------------------	10
					Yellow Indiangrass-------------	10
					Blue grama---------------------	5
					Miscellaneous perennial forbs--	5
					Sideoats grama-----------------	5
					Tall dropseed------------------	5
KekA:						
Keokuk---------	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem-------------------	25
					Miscellaneous perennial grasses	15
					Switchgrass--------------------	15
					Yellow Indiangrass-------------	15
					Little bluestem----------------	10
					Miscellaneous perennial forbs--	10
					Eastern gramagrass-------------	5
					Miscellaneous trees------------	5
KeoA:						
Keokuk---------	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem-------------------	25
					Miscellaneous perennial grasses	15
					Switchgrass--------------------	15
					Yellow Indiangrass-------------	15
					Little bluestem----------------	10
					Miscellaneous perennial forbs--	10
					Eastern gramagrass-------------	5
					Miscellaneous trees------------	5
KeUA:						
Keokuk.						
Urban land.						
KgIC:						
Kingfisher-----	Loamy Prairie, 080AY056OK	5,500	3,850	2,750	Little bluestem----------------	25
					Big bluestem-------------------	20
					Switchgrass--------------------	10
					Yellow Indiangrass-------------	10
					Blue grama---------------------	5
					Miscellaneous perennial forbs--	5
					Sideoats grama-----------------	5
					Tall dropseed------------------	5
Ironmound------	Shallow Prairie, 080AY083OK	3,000	2,100	1,500	Little bluestem----------------	30
					Sideoats grama-----------------	15
					Big bluestem-------------------	10
					Blue grama---------------------	10
					Miscellaneous perennial forbs--	10
					Miscellaneous perennial grasses	10
					Buffalograss-------------------	5
					Sand dropseed------------------	5
					Threeawn-----------------------	5

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
KowB:						
Konawa---------	Sandy Savannah (central), 084AY076OK	5,000	3,500	2,500	Little bluestem----------------	25
					Big bluestem-------------------	20
					Blackjack oak------------------	10
					Post oak-----------------------	10
					Scribner panicum---------------	5
					Miscellaneous perennial forbs--	5
					Miscellaneous trees------------	5
					Purple lovegrass---------------	5
					Purpletop tridens--------------	5
					Sand lovegrass-----------------	5
					Switchgrass--------------------	5
KowD:						
Konawa---------	Sandy Savannah (central), 084AY076OK	5,000	3,500	2,500	Little bluestem----------------	25
					Big bluestem-------------------	20
					Blackjack oak------------------	10
					Post oak-----------------------	10
					Scribner panicum---------------	5
					Miscellaneous perennial forbs--	5
					Miscellaneous trees------------	5
					Purple lovegrass---------------	5
					Purpletop tridens--------------	5
					Sand lovegrass-----------------	5
					Switchgrass--------------------	5
KowD2:						
Konawa---------	Reseeded Sandy Savannah, 084AY876OK	2,700	1,900	1,300	---	---
KowD4:						
Konawa---------	Reseeded Sandy Savannah, 084AY876OK	2,700	1,900	1,300	---	---
KrdA:						
Kirkland-------	Claypan Prairie (north), 080AY010OK	4,000	2,800	2,000	Little bluestem----------------	25
					Big bluestem-------------------	20
					Switchgrass--------------------	15
					Yellow Indiangrass-------------	10
					Blue grama---------------------	5
					Buffalograss-------------------	5
					Sideoats grama-----------------	5
KrUA:						
Kirkland.						
Urban land.						
KUIC:						
Kingfisher.						
Urban land.						
Ironmound.						
KwUD:						
Konawa.						
Urban land.						

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
LarA:						
Lawrie---------	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem------------------	25
					Miscellaneous perennial grasses	15
					Switchgrass-------------------	15
					Yellow Indiangrass------------	15
					Little bluestem---------------	10
					Miscellaneous perennial forbs--	10
					Eastern gramagrass------------	5
					Miscellaneous trees-----------	5
LatG:						
Latrass.						
LawA:						
Lawrie---------	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem------------------	25
					Miscellaneous perennial grasses	15
					Switchgrass-------------------	15
					Yellow Indiangrass------------	15
					Little bluestem---------------	10
					Miscellaneous perennial forbs--	10
					Eastern gramagrass------------	5
					Miscellaneous trees-----------	5
LitB:						
Littleaxe------	Sandy Savannah (central), 084AY076OK	5,000	3,500	2,500	Little bluestem---------------	25
					Big bluestem------------------	20
					Blackjack oak-----------------	10
					Post oak----------------------	10
					Scribner panicum--------------	5
					Miscellaneous perennial forbs--	5
					Miscellaneous trees-----------	5
					Purple lovegrass--------------	5
					Purpletop tridens-------------	5
					Sand lovegrass----------------	5
					Switchgrass-------------------	5
LitC:						
Littleaxe------	Sandy Savannah (central), 084AY076OK	5,000	3,500	2,500	Little bluestem---------------	25
					Big bluestem------------------	20
					Blackjack oak-----------------	10
					Post oak----------------------	10
					Scribner panicum--------------	5
					Miscellaneous perennial forbs--	5
					Miscellaneous trees-----------	5
					Purple lovegrass--------------	5
					Purpletop tridens-------------	5
					Sand lovegrass----------------	5
					Switchgrass-------------------	5
LitC2:						
Littleaxe------	Reseeded Sandy Savannah, 084AY876OK	2,700	1,900	1,300	---	---

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
LomA:						
Lomill---------	Heavy Bottomland, 080AY045OK	5,500	3,700	2,500	Switchgrass--------------------	15
					Blue grama---------------------	10
					Meadow dropseed----------------	10
					Miscellaneous perennial grasses	10
					Sideoats grama-----------------	10
					Western wheatgrass-------------	10
					Canada wildrye-----------------	5
					Alkali sacaton-----------------	5
					Buffalograss-------------------	5
					Fourwing saltbush--------------	5
					Miscellaneous perennial forbs--	5
					Prairie,cordgrass--------------	5
					Vine mesquite------------------	5
LtUC:						
Littleaxe.						
Urban land.						
LweA:						
Lawrie---------	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem-------------------	25
					Miscellaneous perennial grasses	15
					Switchgrass--------------------	15
					Yellow Indiangrass-------------	15
					Little bluestem----------------	10
					Miscellaneous perennial forbs--	10
					Eastern gramagrass-------------	5
					Miscellaneous trees------------	5
LwfA:						
Lawrie---------	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem-------------------	25
					Miscellaneous perennial grasses	15
					Switchgrass--------------------	15
					Yellow Indiangrass-------------	15
					Little bluestem----------------	10
					Miscellaneous perennial forbs--	10
					Eastern gramagrass-------------	5
					Miscellaneous trees------------	5
LwUA:						
Lawrie.						
Urban land.						

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
MlfA:						
Miller	Heavy Bottomland, 080AY045OK	5,500	3,700	2,500	Switchgrass	15
					Blue grama	10
					Meadow dropseed	10
					Miscellaneous perennial grasses	10
					Sideoats grama	10
					Western wheatgrass	10
					Canada wildrye	5
					Alkali sacaton	5
					Buffalograss	5
					Fourwing saltbush	5
					Miscellaneous perennial forbs	5
					Prairie,cordgrass	5
					Vine mesquite	5
MllA:						
Miller	Heavy Bottomland, 080AY045OK	5,500	3,700	2,500	Switchgrass	15
					Blue grama	10
					Meadow dropseed	10
					Miscellaneous perennial grasses	10
					Sideoats grama	10
					Western wheatgrass	10
					Canada wildrye	5
					Alkali sacaton	5
					Buffalograss	5
					Fourwing saltbush	5
					Miscellaneous perennial forbs	5
					Prairie,cordgrass	5
					Vine mesquite	5
M-W:						
Miscellaneous water.						
NewB:						
Newalla	Sandy Savannah (central), 084AY076OK	5,000	3,500	2,500	Little bluestem	25
					Big bluestem	20
					Blackjack oak	10
					Post oak	10
					Scribner panicum	5
					Miscellaneous perennial forbs	5
					Miscellaneous trees	5
					Purple lovegrass	5
					Purpletop tridens	5
					Sand lovegrass	5
					Switchgrass	5
NewC2:						
Newalla	Reseeded Sandy Savannah, 084AY876OK	2,700	1,900	1,300	---	---
NorB:						
Norge	Loamy Prairie, 080AY056OK	5,500	3,850	2,750	Little bluestem	25
					Big bluestem	20
					Switchgrass	10
					Yellow Indiangrass	10
					Blue grama	5
					Miscellaneous perennial forbs	5
					Sideoats grama	5
					Tall dropseed	5

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	Lb/acre	Lb/acre		Pct
NorC:						
Norge	Loamy Prairie, 080AY056OK	5,500	3,850	2,750	Little bluestem	25
					Big bluestem	20
					Switchgrass	10
					Yellow Indiangrass	10
					Blue grama	5
					Miscellaneous perennial forbs	5
					Sideoats grama	5
					Tall dropseed	5
NorC2:						
Norge	Reseeded Loamy Prairie, 080AY856OK	3,300	2,300	1,650	---	---
NoUC:						
Norge.						
Urban land.						
PdHC:						
Piedmont	Claypan Prairie (north), 080AY010OK	4,000	2,800	2,000	Little bluestem	25
					Big bluestem	20
					Switchgrass	15
					Yellow Indiangrass	10
					Blue grama	5
					Buffalograss	5
					Sideoats grama	5
Huska	Slickspot, 080AY091OK	2,000	1,400	1,000	Alkali sacaton	15
					Miscellaneous perennial grasses	15
					Switchgrass	15
					Blue grama	10
					Sideoats grama	10
					Tall dropseed	10
					Scribner panicum	5
					Dotted gayfeather	5
					Miscellaneous perennial forbs	5
					Silver bluestem	5
					Whorled dropseed	5
PieC2:						
Piedmont	Reseeded Claypan Prairie, 080AY810OK	3,300	2,300	1,600	---	---
PimB:						
Piedmont	Claypan Prairie (north), 080AY010OK	4,000	2,800	2,000	Little bluestem	25
					Big bluestem	20
					Switchgrass	15
					Yellow Indiangrass	10
					Blue grama	5
					Buffalograss	5
					Sideoats grama	5
PimC:						
Piedmont	Claypan Prairie (north), 080AY010OK	4,000	2,800	2,000	Little bluestem	25
					Big bluestem	20
					Switchgrass	15
					Yellow Indiangrass	10
					Blue grama	5
					Buffalograss	5
					Sideoats grama	5

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
PIT:						
Pits.						
PukA:						
Pulaski--------	Loamy Bottomland, 084AY050OK	7,000	4,900	3,500	Big bluestem------------------	25
					Switchgrass-------------------	15
					Yellow Indiangrass------------	15
					Miscellaneous trees-----------	10
					Beaked panicum----------------	5
					Eastern gramagrass------------	5
					Miscellaneous perennial forbs--	5
					Prairie,cordgrass-------------	5
					Sedge-------------------------	5
PulA:						
Pulaski--------	Loamy Bottomland, 084AY050OK	7,000	4,900	3,500	Big bluestem------------------	25
					Switchgrass-------------------	15
					Yellow Indiangrass------------	15
					Miscellaneous trees-----------	10
					Beaked panicum----------------	5
					Eastern gramagrass------------	5
					Miscellaneous perennial forbs--	5
					Prairie,cordgrass-------------	5
					Sedge-------------------------	5
RenB:						
Renfrow--------	Claypan Prairie (north), 080AY010OK	4,000	2,800	2,000	Little bluestem---------------	25
					Big bluestem------------------	20
					Switchgrass-------------------	15
					Yellow Indiangrass------------	10
					Blue grama--------------------	5
					Buffalograss------------------	5
					Sideoats grama----------------	5
RinB:						
Renthin--------	Claypan Prairie (north), 080AY010OK	4,000	2,800	2,000	Little bluestem---------------	25
					Big bluestem------------------	20
					Switchgrass-------------------	15
					Yellow Indiangrass------------	10
					Blue grama--------------------	5
					Buffalograss------------------	5
					Sideoats grama----------------	5
RnnB:						
Renthin--------	Claypan Prairie (north), 080AY010OK	4,000	2,800	2,000	Little bluestem---------------	25
					Big bluestem------------------	20
					Switchgrass-------------------	15
					Yellow Indiangrass------------	10
					Blue grama--------------------	5
					Buffalograss------------------	5
					Sideoats grama----------------	5
RnnC2:						
Renthin--------	Reseeded Claypan Prairie, 080AY810OK	3,300	2,300	1,600	---	---
RnUC:						
Renthin.						
Urban land.						

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Total dry-weight production: Normal year	Total dry-weight production: Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
SDGD4:						
Stephenville---	Reseeded Sandy Savannah, 084AY876OK	2,700	1,900	1,300	---	---
Darsil---------	Reseeded Shallow Savannah 084AY889OK	1,700	1,100	800	---	---
Gullied land.						
SDND:						
Stephenville---	Sandy Savannah (central), 084AY076OK	5,000	3,500	2,500	Little bluestem----------------	25
					Big bluestem-------------------	20
					Blackjack oak------------------	10
					Post oak-----------------------	10
					Scribner panicum---------------	5
					Miscellaneous perennial forbs--	5
					Miscellaneous trees------------	5
					Purple lovegrass---------------	5
					Purpletop tridens--------------	5
					Sand lovegrass-----------------	5
					Switchgrass--------------------	5
Darsil---------	Shallow Savannah, 084AY089OK	3,200	2,100	1,400	Little bluestem----------------	30
					Big bluestem-------------------	20
					Blackjack oak------------------	10
					Miscellaneous perennial grasses	10
					Post oak-----------------------	10
					Miscellaneous perennial forbs--	5
					Miscellaneous shrubs-----------	5
					Sideoats grama-----------------	5
					Yellow Indiangrass-------------	5
Newalla--------	Sandy Savannah (central), 084AY076OK	5,000	3,500	2,500	Little bluestem----------------	25
					Big bluestem-------------------	20
					Blackjack oak------------------	10
					Post oak-----------------------	10
					Scribner panicum---------------	5
					Miscellaneous perennial forbs--	5
					Miscellaneous trees------------	5
					Purple lovegrass---------------	5
					Purpletop tridens--------------	5
					Sand lovegrass-----------------	5
					Switchgrass--------------------	5
SDND2:						
Stephenville---	Reseeded Sandy Savannah, 084AY876OK	2,700	1,900	1,300	---	---
Darsil---------	Reseeded Shallow Savannah 084AY889OK	1,700	1,100	800	---	---
Newalla--------	Reseeded Sandy Savannah, 084AY876OK	2,700	1,900	1,300	---	---

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	Lb/acre	Lb/acre		Pct
StDC:						
Stephenville	Sandy Savannah (central), 084AY076OK	5,000	3,500	2,500	Little bluestem	25
					Big bluestem	20
					Blackjack oak	10
					Post oak	10
					Scribner panicum	5
					Miscellaneous perennial forbs	5
					Miscellaneous trees	5
					Purple lovegrass	5
					Purpletop tridens	5
					Sand lovegrass	5
					Switchgrass	5
Darsil	Shallow Savannah, 084AY089OK	3,200	2,100	1,400	Little bluestem	30
					Big bluestem	20
					Blackjack oak	10
					Miscellaneous perennial grasses	10
					Post oak	10
					Miscellaneous perennial forbs	5
					Miscellaneous shrubs	5
					Sideoats grama	5
					Yellow Indiangrass	5
StDC2:						
Stephenville	Reseeded Sandy Savannah, 084AY876OK	2,700	1,900	1,300	---	---
Darsil	Reseeded Shallow Savannah 084AY889OK	1,700	1,100	800	---	---
StLC4:						
Stephenville	Reseeded Sandy Savannah, 084AY876OK	2,700	1,900	1,300	---	---
Littleaxe	Reseeded Sandy Savannah, 084AY876OK	2,700	1,900	1,300	---	---
SUND:						
Stephenville.						
Urban land.						
Newalla.						
TevD:						
Teval	Loamy Prairie, 080AY056OK	5,500	3,850	2,750	Little bluestem	25
					Big bluestem	20
					Switchgrass	10
					Yellow Indiangrass	10
					Blue grama	5
					Miscellaneous perennial forbs	5
					Sideoats grama	5
					Tall dropseed	5
TevD2:						
Teval	Reseeded Loamy Prairie, 080AY856OK	3,300	2,300	1,650	---	---

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
TlrB:						
Teller---------	Sandy Prairie, 080AY073OK	4,500	3,200	2,000	Little bluestem----------------	30
					Big bluestem-------------------	25
					Switchgrass--------------------	10
					Yellow Indiangrass-------------	10
					Blue grama---------------------	5
					Sand sagebrush-----------------	5
					Sideoats grama-----------------	5
					Sand lovegrass-----------------	3
					Skunkbush sumac----------------	2
TlrC:						
Teller---------	Sandy Prairie, 080AY073OK	4,500	3,200	2,000	Little bluestem----------------	30
					Big bluestem-------------------	25
					Switchgrass--------------------	10
					Yellow Indiangrass-------------	10
					Blue grama---------------------	5
					Sand sagebrush-----------------	5
					Sideoats grama-----------------	5
					Sand lovegrass-----------------	3
					Skunkbush sumac----------------	2
TlrC2:						
Teller---------	Reseeded Sandy Prairie, 080AY873OK	2,650	2,000	1,300	---	---
TlrD:						
Teller---------	Sandy Prairie, 080AY073OK	4,500	3,200	2,000	Little bluestem----------------	30
					Big bluestem-------------------	25
					Switchgrass--------------------	10
					Yellow Indiangrass-------------	10
					Blue grama---------------------	5
					Sand sagebrush-----------------	5
					Sideoats grama-----------------	5
					Sand lovegrass-----------------	3
					Skunkbush sumac----------------	2
TlUD:						
Teller.						
Urban land.						
TriA:						
Tribbey--------	Subirrigated, 084AY095OK	6,000	4,200	3,000	Switchgrass--------------------	25
					Miscellaneous perennial grasses	15
					Eastern gramagrass-------------	10
					Miscellaneous shrubs-----------	10
					Sedge--------------------------	10
					Big bluestem-------------------	5
					Bulrush------------------------	5
					Bushy bluestem-----------------	5
					Miscellaneous perennial forbs--	5
					Prairie,cordgrass--------------	5
					Yellow Indiangrass-------------	5
URB:						
Urban land.						

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
VanA:						
Vanoss---------	Loamy Prairie, 080AY056OK	5,500	3,850	2,750	Little bluestem----------------	25
					Big bluestem-------------------	20
					Switchgrass--------------------	10
					Yellow Indiangrass-------------	10
					Blue grama---------------------	5
					Miscellaneous perennial forbs--	5
					Sideoats grama-----------------	5
					Tall dropseed------------------	5
VanB:						
Vanoss---------	Loamy Prairie, 080AY056OK	5,500	3,850	2,750	Little bluestem----------------	25
					Big bluestem-------------------	20
					Switchgrass--------------------	10
					Yellow Indiangrass-------------	10
					Blue grama---------------------	5
					Miscellaneous perennial forbs--	5
					Sideoats grama-----------------	5
					Tall dropseed------------------	5
W:						
Water.						
WauA:						
Waurika--------	Claypan Prairie (north), 080AY010OK	4,000	2,800	2,000	Little bluestem----------------	25
					Big bluestem-------------------	20
					Switchgrass--------------------	15
					Yellow Indiangrass-------------	10
					Blue grama---------------------	5
					Buffalograss-------------------	5
					Sideoats grama-----------------	5
WtgA:						
Watonga--------	Heavy Bottomland, 080AY045OK	5,500	3,700	2,500	Switchgrass--------------------	15
					Blue grama---------------------	10
					Meadow dropseed----------------	10
					Miscellaneous perennial grasses	10
					Sideoats grama-----------------	10
					Western wheatgrass-------------	10
					Canada wildrye-----------------	5
					Alkali sacaton-----------------	5
					Buffalograss-------------------	5
					Fourwing saltbush--------------	5
					Miscellaneous perennial forbs--	5
					Prairie,cordgrass--------------	5
					Vine mesquite------------------	5
WuUA:						
Watonga.						
Urban land.						
YaGA:						
Yahola---------	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem-------------------	25
					Miscellaneous perennial grasses	15
					Switchgrass--------------------	15
					Yellow Indiangrass-------------	15
					Little bluestem----------------	10
					Miscellaneous perennial forbs--	10
					Eastern gramagrass-------------	5
					Miscellaneous trees------------	5

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
YaGA:						
Gaddy----------	Sandy Bottomland, 080AY068OK	3,800	2,700	2,000	Switchgrass--------------------	30
					Big bluestem-------------------	15
					Yellow Indiangrass-------------	15
					Annual grasses-----------------	10
					Texas bluegrass----------------	5
					Little bluestem----------------	5
					Miscellaneous perennial forbs--	5
					Miscellaneous perennial grasses	5
					Miscellaneous trees------------	5
					Threeawn-----------------------	5
YahA:						
Yahola---------	Loamy Bottomland, 080AY050OK	8,500	6,100	4,500	Big bluestem-------------------	25
					Miscellaneous perennial grasses	15
					Switchgrass--------------------	15
					Yellow Indiangrass-------------	15
					Little bluestem----------------	10
					Miscellaneous perennial forbs--	10
					Eastern gramagrass-------------	5
					Miscellaneous trees------------	5
YaUA:						
Yahola.						
Urban land.						
ZanB:						
Zaneis---------	Loamy Prairie, 080AY056OK	5,500	3,850	2,750	Little bluestem----------------	25
					Big bluestem-------------------	20
					Switchgrass--------------------	10
					Yellow Indiangrass-------------	10
					Blue grama---------------------	5
					Miscellaneous perennial forbs--	5
					Sideoats grama-----------------	5
					Tall dropseed------------------	5
ZanC:						
Zaneis---------	Loamy Prairie, 080AY056OK	5,500	3,850	2,750	Little bluestem----------------	25
					Big bluestem-------------------	20
					Switchgrass--------------------	10
					Yellow Indiangrass-------------	10
					Blue grama---------------------	5
					Miscellaneous perennial forbs--	5
					Sideoats grama-----------------	5
					Tall dropseed------------------	5
ZanC2:						
Zaneis---------	Reseeded Loamy Prairie, 080AY856OK	3,300	2,300	1,650	---	---
ZaUC:						
Zaneis.						
Urban land.						

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Windbreaks are often planted on land that did not originally support trees. Knowledge of how trees perform on such land can be gained only by observing and recording the performance of trees that have been planted and have survived. Many popular windbreak species are not indigenous to the areas in which they are planted.

Each tree or shrub species has certain climatic and physiographic limits. Within these parameters, a tree or shrub may grow well or grow poorly, depending on the characteristics of the soil. Each tree or shrub has definable potential heights in a given physiographic area and under given climatic conditions. Accurate definitions of potential heights are necessary when a windbreak is planned and designed.

The table “Windbreaks and Environmental Plantings” shows the height that locally grown trees and shrubs are expected to reach in 20 years on soils in the county. The estimates in this table are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Natural Resources Conservation Service or the Cooperative Extension Service or from a local nursery.

Windbreaks and Environmental Plantings

(Absence of an entry indicates that trees generally do not grow to the given height on the soil.)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
AhpA:					
Ashport-------	---	Eastern redbud	Eastern redcedar, ponderosa pine, Russian-olive, red mulberry	Bur oak, common hackberry, green ash, osageorange, black locust, honeylocust	Eastern cottonwood
AmbE:					
Amber.					
AshA:					
Asher---------	---	Eastern redbud	Eastern redcedar, ponderosa pine, Russian-olive, red mulberry	Bur oak, common hackberry, green ash, osageorange, black locust, honeylocust	Eastern cottonwood
AspA:					
Ashport-------	---	Eastern redbud	Eastern redcedar, ponderosa pine, Russian-olive, red mulberry	Bur oak, common hackberry, green ash, osageorange, black locust, honeylocust	Eastern cottonwood
AstA:					
Ashport-------	---	Eastern redbud	Eastern redcedar, ponderosa pine, Russian-olive, red mulberry	Bur oak, common hackberry, green ash, osageorange, black locust, honeylocust	Eastern cottonwood
BetA:					
Bethany-------	Amur honeysuckle	American plum, eastern redcedar	Austrian pine, Russian-olive, common hackberry, osageorange, ponderosa pine, green ash, honeylocust, red mulberry, black locust	---	---
BetB:					
Bethany-------	Amur honeysuckle	American plum, eastern redcedar	Austrian pine, Russian-olive, common hackberry, osageorange, ponderosa pine, green ash, honeylocust, red mulberry, black locust	---	---

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
BeUB:					
Bethany	Amur honeysuckle	American plum, eastern redcedar	Austrian pine, Russian-olive, common hackberry, osageorange, ponderosa pine, green ash, honeylocust, red mulberry, black locust	---	---
Urban land.					
CaaA:					
Canadian	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
CaUB:					
Canadian	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
Urban land.					
CoIC2:					
Coyle	Red mulberry	Rocky Mountain juniper, common hackberry	Amur honeysuckle, Austrian pine, Russian-olive, black locust, eastern redcedar, green ash, osageorange, ponderosa pine, honeylocust	---	---
Ironmound	Common lilac, Amur honeysuckle	Oriental arborvitae, eastern redcedar, osageorange	---	---	---
CoUB:					
Coyle	Red mulberry	Rocky Mountain juniper, common hackberry	Amur honeysuckle, Austrian pine, Russian-olive, black locust, eastern redcedar, green ash, osageorange, ponderosa pine, honeylocust	---	---
Urban land.					
CoyB:					
Coyle	Red mulberry	Rocky Mountain juniper, common hackberry	Amur honeysuckle, Austrian pine, Russian-olive, black locust, eastern redcedar, green ash, osageorange, ponderosa pine, honeylocust	---	---

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
DalA:					
Dale	---	---	Eastern redcedar, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
DAM:					
Dams.					
DaUA:					
Dale	---	---	Eastern redcedar, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
Urban land.					
DeDE:					
Derby	---	---	Oriental arborvitae, eastern redcedar, Austrian pine	---	---
Dougherty	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae	Austrian pine, Chinese elm, black locust, green ash	---
DerB:					
Derby	---	---	Oriental arborvitae, eastern redcedar, Austrian pine	---	---
DerE:					
Derby	---	---	Oriental arborvitae, eastern redcedar, Austrian pine	---	---
DleA:					
Dale	---	---	Eastern redcedar, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
DSRG:					
Darsil.					
Stephenville	Amur honeysuckle	---	Red mulberry, black locust, eastern redcedar, green ash, osageorange, Austrian pine	Siberian elm	---
Rock outcrop.					
DUDE:					
Derby	---	---	Oriental arborvitae, eastern redcedar, Austrian pine	---	---
Urban land.					
Dougherty	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae	Austrian pine, Chinese elm, black locust, green ash	---

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
EasA:					
Easpur	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, common hackberry, green ash, osageorange, black locust	Eastern cottonwood
GaGA:					
Gaddy	Skunkbush sumac	Amur honeysuckle, common lilac, American plum	Austrian pine	Eastern redcedar, Chinese elm, osageorange, red mulberry	American sycamore, eastern cottonwood
Gracemore	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
GcmA:					
Gracemont	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
GmtA:					
Gracemont	Skunkbush sumac	Common lilac, American plum, Amur honeysuckle	---	Osageorange	Green ash, American sycamore, eastern cottonwood
GraC:					
Grainola	---	---	Austrian pine, black locust, osageorange, ponderosa pine, red mulberry	---	---
GrAD:					
Grainola	---	---	Austrian pine, black locust, osageorange, ponderosa pine, red mulberry	---	---
Ashport	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
GrHC:					
Grant	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, Austrian pine, green ash, osageorange, ponderosa pine	Chinese elm, black locust	---
Huska.					
GrIE:					
Grainola	---	---	Austrian pine, black locust, osageorange, ponderosa pine, red mulberry	---	---

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
GrIE:					
Ironmound.					
GrPB2:					
Grainola------	Common lilac, skunkbush sumac	Amur honeysuckle, Austrian pine	Eastern redcedar, osageorange, red mulberry	Chinese elm	---
Piedmont------	Amur honeysuckle	Eastern redcedar, green ash	Austrian pine, black locust, osageorange, ponderosa pine, red mulberry	Common hackberry	---
GrPC2:					
Grainola------	Common lilac, skunkbush sumac	Amur honeysuckle, Austrian pine	Eastern redcedar, osageorange, red mulberry	Chinese elm	---
Piedmont------	Amur honeysuckle	Eastern redcedar, green ash	Austrian pine, black locust, osageorange, ponderosa pine, red mulberry	Common hackberry	---
GUIE:					
Grainola------	---	---	Austrian pine, black locust, osageorange, ponderosa pine, red mulberry	---	---
Urban land.					
Ironmound.					
HarC:					
Harrah--------	---	Amur honeysuckle	Eastern redcedar, oriental arborvitae, red mulberry, Austrian pine, green ash, ponderosa pine	Black locust, osageorange	---
HarC2:					
Harrah--------	---	Amur honeysuckle	Eastern redcedar, oriental arborvitae, red mulberry, Austrian pine, green ash, ponderosa pine	Black locust, osageorange	---
HarC4:					
Harrah--------	---	Amur honeysuckle	Eastern redcedar, oriental arborvitae, red mulberry, Austrian pine, green ash, ponderosa pine	Black locust, osageorange	---

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
HarG:					
Harrah--------	---	Amur honeysuckle	Eastern redcedar, oriental arborvitae, red mulberry, Austrian pine, green ash, ponderosa pine	Black locust, osageorange	---
HaUC:					
Harrah--------	---	Amur honeysuckle	Eastern redcedar, oriental arborvitae, red mulberry, Austrian pine, green ash, ponderosa pine	Black locust, osageorange	---
Urban land.					
HiLA:					
Hibsaw.					
Lomill--------	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, common hackberry, green ash, osageorange, black locust	Eastern cottonwood
IrCE:					
Ironmound.					
Coyle---------	Red mulberry	Rocky Mountain juniper, common hackberry	Amur honeysuckle, Austrian pine, Russian-olive, black locust, eastern redcedar, green ash, osageorange, ponderosa pine, honeylocust	---	---
IrKD:					
Ironmound.					
Kingfisher----	Amur honeysuckle	Red mulberry	Austrian pine, black locust, eastern redcedar, green ash, osageorange, ponderosa pine	---	---
KekA:					
Keokuk--------	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, common hackberry, osageorange, black locust	Eastern cottonwood
KeoA:					
Keokuk--------	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, common hackberry, osageorange, black locust	Eastern cottonwood

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
KeUA:					
Keokuk	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, common hackberry, osageorange, black locust	Eastern cottonwood
Urban land.					
KgIC:					
Kingfisher	Amur honeysuckle	Red mulberry	Austrian pine, black locust, eastern redcedar, green ash, osageorange, ponderosa pine	---	---
Ironmound.					
KowB:					
Konawa	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, red mulberry	Austrian pine, Chinese elm, black locust, green ash	---
KowD:					
Konawa	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, red mulberry	Austrian pine, Chinese elm, black locust, green ash	---
KowD2:					
Konawa	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, red mulberry	Austrian pine, Chinese elm, black locust, green ash	---
KowD4:					
Konawa	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, red mulberry	Austrian pine, Chinese elm, black locust, green ash	---
KrdA:					
Kirkland	Amur honeysuckle	American plum, eastern redcedar	Austrian pine, osageorange, ponderosa pine, green ash, red mulberry, black locust	---	---
KrUA:					
Kirkland	Amur honeysuckle	American plum, eastern redcedar	Austrian pine, osageorange, ponderosa pine, green ash, red mulberry, black locust	---	---
Urban land.					

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
KUIC:					
Kingfisher----	Amur honeysuckle	Red mulberry	Austrian pine, black locust, eastern redcedar, green ash, osageorange, ponderosa pine	---	---
Urban land.					
Ironmound.					
KwUD:					
Konawa--------	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, red mulberry	Austrian pine, Chinese elm, black locust, green ash	---
Urban land.					
LarA:					
Lawrie--------	---	---	Eastern redcedar, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
LatG:					
Latrass.					
LawA:					
Lawrie--------	---	---	Eastern redcedar, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
LitB:					
Littleaxe-----	---	Amur honeysuckle	Eastern redcedar, oriental arborvitae, red mulberry, Austrian pine, green ash, ponderosa pine	Black locust, osageorange	---
LitC:					
Littleaxe-----	---	Amur honeysuckle	Eastern redcedar, oriental arborvitae, red mulberry, Austrian pine, green ash, ponderosa pine	Black locust, osageorange	---
LitC2:					
Littleaxe-----	---	Amur honeysuckle	Eastern redcedar, oriental arborvitae, red mulberry, Austrian pine, green ash, ponderosa pine	Black locust, osageorange	---
LomA:					
Lomill--------	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, common hackberry, green ash, osageorange, black locust	Eastern cottonwood

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
LtUC:					
Littleaxe-----	---	Amur honeysuckle	Eastern redcedar, oriental arborvitae, red mulberry, Austrian pine, green ash, ponderosa pine	Black locust, osageorange	---
Urban land.					
LweA:					
Lawrie--------	---	---	Eastern redcedar, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
LwfA:					
Lawrie--------	---	---	Eastern redcedar, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
LwUA:					
Lawrie--------	---	---	Eastern redcedar, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
Urban land.					
MlfA:					
Miller--------	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, common hackberry, green ash, osageorange, black locust	Eastern cottonwood
MllA:					
Miller--------	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, common hackberry, green ash, osageorange, black locust	Eastern cottonwood
M-W:					
Miscellaneous water.					
NewB:					
Newalla-------	---	American plum, Amur honeysuckle	Eastern redcedar, Austrian pine, bur oak, green ash, osageorange	Chinese elm, black locust	---
NewC2:					
Newalla-------	---	American plum, Amur honeysuckle	Eastern redcedar, Austrian pine, bur oak, green ash, osageorange	Chinese elm, black locust	---
NorB:					
Norge---------	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, Austrian pine, green ash, osageorange, ponderosa pine	Chinese elm, black locust	---

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
NorC:					
Norge	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, Austrian pine, green ash, osageorange, ponderosa pine	Chinese elm, black locust	---
NorC2:					
Norge	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, Austrian pine, green ash, osageorange, ponderosa pine	Chinese elm, black locust	---
NoUC:					
Norge	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, Austrian pine, green ash, osageorange, ponderosa pine	Chinese elm, black locust	---
Urban land.					
PdHC:					
Piedmont	Amur honeysuckle	Eastern redcedar, green ash	Austrian pine, black locust, osageorange, ponderosa pine, red mulberry	Common hackberry	---
Huska.					
PieC2:					
Piedmont	Amur honeysuckle	Eastern redcedar, common hackberry, green ash	Austrian pine, black locust, osageorange, ponderosa pine, red mulberry	---	---
PimB:					
Piedmont	Amur honeysuckle	Eastern redcedar, common hackberry, green ash	Austrian pine, black locust, osageorange, ponderosa pine, red mulberry	---	---
PimC:					
Piedmont	Amur honeysuckle	Eastern redcedar, common hackberry, green ash	Austrian pine, black locust, osageorange, ponderosa pine, red mulberry	---	---
PIT:					
Pits.					

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
PukA:					
Pulaski-------	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
PulA:					
Pulaski-------	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
RenB:					
Renfrow-------	---	American plum, Amur honeysuckle, eastern redcedar	Austrian pine, black locust, osageorange, ponderosa pine, green ash, red mulberry	---	---
RinB:					
Renthin-------	Amur honeysuckle	American plum, eastern redcedar	Austrian pine, osageorange, ponderosa pine, green ash, red mulberry, black locust	---	---
RnnB:					
Renthin-------	Amur honeysuckle	American plum, eastern redcedar	Austrian pine, osageorange, ponderosa pine, green ash, red mulberry, black locust	---	---
RnnC2:					
Renthin-------	Amur honeysuckle	American plum, eastern redcedar	Austrian pine, osageorange, ponderosa pine, green ash, red mulberry, black locust	---	---
RnUC:					
Renthin-------	Amur honeysuckle	American plum, eastern redcedar	Austrian pine, osageorange, ponderosa pine, green ash, red mulberry, black locust	---	---
Urban land.					
SDGD4:					
Stephenville--	Amur honeysuckle	---	Red mulberry, black locust, eastern redcedar, green ash, osageorange, Austrian pine	Siberian elm	---
Darsil.					
Gullied land.					

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
SDND:					
Stephenville--	Amur honeysuckle	---	Red mulberry, black locust, eastern redcedar, green ash, osageorange, Austrian pine	Siberian elm	---
Darsil.					
Newalla-------	---	American plum, Amur honeysuckle	Eastern redcedar, Austrian pine, bur oak, green ash, osageorange	Chinese elm, black locust	---
SDND2:					
Stephenville--	Amur honeysuckle	---	Red mulberry, black locust, eastern redcedar, green ash, osageorange, Austrian pine	Siberian elm	---
Darsil.					
Newalla-------	---	American plum, Amur honeysuckle	Eastern redcedar, Austrian pine, bur oak, green ash, osageorange	Chinese elm, black locust	---
StDC:					
Stephenville--	Amur honeysuckle	---	Red mulberry, black locust, eastern redcedar, green ash, osageorange, Austrian pine	Siberian elm	---
Darsil.					
StDC2:					
Stephenville--	Amur honeysuckle	---	Red mulberry, black locust, eastern redcedar, green ash, osageorange, Austrian pine	Siberian elm	---
Darsil.					
StLC4:					
Stephenville--	Amur honeysuckle	---	Red mulberry, black locust, eastern redcedar, green ash, osageorange, Austrian pine	Siberian elm	---
Littleaxe-----	---	Amur honeysuckle	Eastern redcedar, oriental arborvitae, red mulberry, Austrian pine, green ash, ponderosa pine	Black locust, osageorange	---

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
SUND:					
Stephenville--	Amur honeysuckle	---	Red mulberry, black locust, eastern redcedar, green ash, osageorange, Austrian pine	Siberian elm	---
Urban land.					
Newalla-------	---	American plum, Amur honeysuckle	Eastern redcedar, Austrian pine, bur oak, green ash, osageorange	Chinese elm, black locust	---
TevD:					
Teval---------	---	Amur honeysuckle	Eastern redcedar, oriental arborvitae, red mulberry, Austrian pine, ponderosa pine	Black locust, green ash, osageorange	---
TevD2:					
Teval---------	---	Amur honeysuckle	Eastern redcedar, oriental arborvitae, red mulberry, Austrian pine, ponderosa pine	Black locust, green ash, osageorange	---
TlrB:					
Teller--------	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, Austrian pine, green ash, osageorange, ponderosa pine	Chinese elm, black locust	---
TlrC:					
Teller--------	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, Austrian pine, green ash, osageorange, ponderosa pine	Chinese elm, black locust	---
TlrC2:					
Teller--------	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, Austrian pine, green ash, osageorange, ponderosa pine	Chinese elm, black locust	---

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
TlrD:					
Teller	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, Austrian pine, green ash, osageorange, ponderosa pine	Chinese elm, black locust	---
TlUD:					
Teller	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, Austrian pine, green ash, osageorange, ponderosa pine	Chinese elm, black locust	---
Urban land.					
TriA:					
Tribbey	---	American plum	Eastern redcedar, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
URB:					
Urban land.					
VanA:					
Vanoss	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, Austrian pine, green ash, osageorange, ponderosa pine	Chinese elm, black locust	---
VanB:					
Vanoss	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, Austrian pine, green ash, osageorange, ponderosa pine	Chinese elm, black locust	---
W:					
Water.					
WauA:					
Waurika	Common lilac, skunkbush sumac	Amur honeysuckle, Austrian pine	Eastern redcedar, oriental arborvitae, osageorange	Chinese elm	---
WtgA:					
Watonga	Amur honeysuckle	Eastern redcedar, common hackberry, green ash	Austrian pine, black locust, osageorange, ponderosa pine, red mulberry	---	---

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
WuUA:					
Watonga	Amur honeysuckle	Eastern redcedar, common hackberry, green ash	Austrian pine, black locust, osageorange, ponderosa pine, red mulberry	---	---
Urban land.					
YaGA:					
Yahola	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
Gaddy	Skunkbush sumac	Amur honeysuckle, common lilac, American plum	Austrian pine	Eastern redcedar, Chinese elm, osageorange, red mulberry	American sycamore, eastern cottonwood
YahA:					
Yahola	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
YaUA:					
Yahola	---	---	Eastern redcedar, ponderosa pine, red mulberry	Bur oak, green ash, osageorange, black locust	Eastern cottonwood
Urban land.					
ZanB:					
Zaneis	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, Austrian pine, green ash, osageorange, ponderosa pine	Chinese elm, black locust	---
ZanC:					
Zaneis	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, Austrian pine, green ash, osageorange, ponderosa pine	Chinese elm, black locust	---
ZanC2:					
Zaneis	Skunkbush sumac	Common lilac, American plum, Amur honeysuckle	---	Austrian pine, eastern redcedar, osageorange, red mulberry	Chinese elm
ZaUC:					
Zaneis	---	American plum, Amur honeysuckle	Eastern redcedar, oriental arborvitae, Austrian pine, green ash, osageorange, ponderosa pine	Chinese elm, black locust	---
Urban land.					

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. If food, cover, or water is missing, inadequate, or inaccessible, wildlife will be scarce or will not inhabit the area.

The table “Wildlife Habitat” in this section shows the soils that have potential for habitat development. Wildlife habitat can be created or improved by planting appropriate vegetation, properly managing the existing plant cover, and fostering the natural establishment of desirable plants.

Elements of Wildlife Habitat

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants used by wildlife. Examples are wheat, rye, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes planted for wildlife food and cover. Examples are fescue, bromegrass, timothy, orchardgrass, clover, alfalfa, trefoil, reed canarygrass, and crownvetch.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are bluestem, indiangrass, blueberry, goldenrod, lambsquarters, dandelions, blackberry, ragweed, wheatgrass, fescue, and nightshade.

The major soil properties affecting the growth of grain and forage crops and wild herbaceous plants are depth of the root zone, texture of the surface layer, the amount of water available to plants, wetness, salinity or sodicity, and flooding. The length of the growing season also is important.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage that wildlife eat. Examples are oak, poplar, boxelder, birch, maple, green ash, willow, and American elm. Examples of fruit-producing shrubs that are suitable for planting on soils that have good potential for these plants are hawthorn, honeysuckle, American plum, redosier dogwood, chokecherry, serviceberry, silver buffaloberry, and crabapple.

Coniferous plants are cone-bearing trees, shrubs, or ground cover that provides habitat or supplies food in the form of browse, seed, or fruitlike cones. Examples are pine, spruce, hemlock, fir, yew, cedar, larch, and juniper.

The major soil properties affecting the growth of hardwood and coniferous trees and shrubs are depth of the root zone, the amount of water available to plants, and wetness.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Wetland plants produce food or cover for wetland wildlife. Examples of these plants are smartweed, wild millet, rushes, sedges, bulrushes, wild rice, arrowhead, waterplantain, pickerelweed, and cattail.

The major soil properties affecting wetland plants are texture of the surface layer, wetness, acidity or alkalinity, and slope.

Shallow water areas have an average depth of less than 5 feet. They are useful as habitat for some wildlife species. They are naturally wet areas or are created by dams, levees, or water-control measures in marshes or streams. Examples are muskrat marshes, waterfowl feeding areas, wildlife watering developments, beaver ponds, and other wildlife ponds.

The major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability.

Kinds of Wildlife Habitat

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, and shrubs. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include Hungarian partridge, pheasant, sharp-tailed grouse, sage grouse, meadowlark, field sparrow, killdeer, cottontail rabbit, and red fox.

Habitat for woodland wildlife consists of areas of

hardwoods and/or conifers and associated grasses, legumes, and wild herbaceous plants. The wildlife attracted to this habitat include wild turkey, ruffed grouse, thrushes, woodpeckers, owls, tree squirrels, porcupine, raccoon, deer, elk, and black bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas that support water-tolerant plants. The wildlife attracted to this habitat include ducks, geese, herons, bitterns, rails, kingfishers, muskrat, otter, mink, and beaver.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. The wildlife attracted to rangeland include antelope, deer, sage grouse, meadowlark, and lark bunting.

Wildlife Habitat

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
AhpA:												
Ashport	Good	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Poor	Good
AmbE:												
Amber	Fair	Good	Good	---	---	Good	Very poor	Very poor	Good	---	Very poor	Good
AshA:												
Asher	Good	Good	Fair	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
AspA:												
Ashport	Good	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Poor	Good
AstA:												
Ashport	Poor	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Poor	Fair
BetA:												
Bethany	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
BetB:												
Bethany	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
BeUB:												
Bethany	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
Urban land.												
CaaA:												
Canadian	Good	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
CaUB:												
Canadian	Good	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
Urban land.												
CoIC2:												
Coyle	Fair	Good	Good	---	---	Fair	Very poor	Very poor	Good	---	Very poor	Fair
Ironmound	Poor	Poor	Fair	---	---	Poor	Very poor	Very poor	Poor	Very poor	Very poor	Poor
CoUB:												
Coyle	Fair	Good	Good	---	---	Fair	Very poor	Very poor	Good	---	Very poor	Fair
Urban land.												

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
CoyB:												
Coyle	Fair	Good	Good	---	---	Fair	Very poor	Very poor	Good	---	Very poor	Fair
DalA:												
Dale	Good	Good	Fair	---	---	Good	Poor	Very poor	Good	---	Very poor	Fair
DAM:												
Dams.												
DaUA:												
Dale	Good	Good	Fair	---	---	Good	Poor	Very poor	Good	---	Very poor	Fair
Urban land.												
DeDE:												
Derby	Fair	Fair	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Dougherty	Poor	Fair	Good	---	---	Good	Very poor	Very poor	Fair	---	Very poor	Good
DerB:												
Derby	Fair	Fair	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
DerE:												
Derby	Fair	Fair	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
DleA:												
Dale	Good	Good	Fair	---	---	Good	Poor	Very poor	Good	---	Very poor	Fair
DSRG:												
Darsil	Very poor	Poor	Poor	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Poor
Stephenville	Poor	Fair	Good	---	---	Good	Very poor	Very poor	Fair	---	Very poor	Good
Rock outcrop	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
DUDE:												
Derby	Fair	Fair	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Urban land.												
Dougherty	Poor	Fair	Good	---	---	Good	Very poor	Very poor	Fair	---	Very poor	Good
EasA:												
Easpur	Good	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good

Wildlife Habitat--Continued

Map symbol and soil name	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hard-wood trees	Conif-erous plants	Shrubs	Wetland plants	Shallow water areas	Open-land wild-life	Wood-land wild-life	Wetland wild-life	Range-land wild-life
	Potential for habitat elements								Potential as habitat for--			
GaGA:												
Gaddy	Poor	Fair	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor	Fair
Gracemore	Poor	Fair	Fair	Good	Good	Good	Fair	Fair	Fair	Fair	Fair	Fair
GcmA:												
Gracemont	Poor	Fair	Poor	Fair	Fair	---	Poor	Good	Fair	Fair	Fair	Fair
GmtA:												
Gracemont	Fair	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor	Good
GraC:												
Grainola	Fair	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
GrAD:												
Grainola	Fair	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Ashport	Poor	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Poor	Fair
GrHC:												
Grant	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
Huska	Poor	Poor	Very poor	---	---	Poor	Poor	Very poor	Poor	---	Very poor	Very poor
GrIE:												
Grainola	Fair	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Ironmound	Poor	Poor	Fair	---	---	Poor	Very poor	Very poor	Poor	Very poor	Very poor	Poor
GrPB2:												
Grainola	Fair	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Piedmont	Fair	Good	Good	---	---	Poor	Poor	Very poor	Good	---	Very poor	Fair
GrPC2:												
Grainola	Fair	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Piedmont	Fair	Good	Fair	---	---	Poor	Poor	Very poor	Fair	---	Very poor	Poor
GUIE:												
Grainola	Fair	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Urban land.												
Ironmound	Poor	Poor	Fair	---	---	Poor	Very poor	Very poor	Poor	Very poor	Very poor	Poor

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
HarC:												
Harrah	Fair	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
HarC2:												
Harrah	Fair	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
HarC4:												
Harrah	Fair	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
HarG:												
Harrah	Fair	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
HaUC:												
Harrah	Fair	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
Urban land.												
HiLA:												
Hibsaw	Very poor	Poor	Very poor	Very poor	---	---	Good	Good	Very poor	Very poor	Good	Very poor
Lomill	Fair	Good	Fair	---	---	Good	Fair	Good	Fair	---	Fair	Fair
IrCE:												
Ironmound	Poor	Poor	Fair	---	---	Poor	Very poor	Very poor	Poor	Very poor	Very poor	Poor
Coyle	Fair	Good	Good	---	---	Fair	Very poor	Very poor	Good	---	Very poor	Fair
IrKD:												
Ironmound	Poor	Poor	Fair	---	---	Poor	Very poor	Very poor	Poor	Very poor	Very poor	Poor
Kingfisher	Fair	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
KekA:												
Keokuk	Good	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
KeoA:												
Keokuk	Good	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
KeUA:												
Keokuk	Good	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
Urban land.												
KgIC:												
Kingfisher	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
KgIC:												
Ironmound	Poor	Poor	Fair	---	---	Poor	Very poor	Very poor	Poor	Very poor	Very poor	Poor
KowB:												
Konawa	Good	Good	Good	---	---	Good	Very poor	Very poor	Good	---	Very poor	Good
KowD:												
Konawa	Fair	Good	Good	---	---	Good	Very poor	Very poor	Good	---	Very poor	Good
KowD2:												
Konawa	Fair	Good	Good	---	---	Good	Very poor	Very poor	Good	---	Very poor	Good
KowD4:												
Konawa	Fair	Good	Good	---	---	Good	Very poor	Very poor	Good	---	Very poor	Good
KrdA:												
Kirkland	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
KrUA:												
Kirkland	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
Urban land.												
KUIC:												
Kingfisher	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
Urban land.												
Ironmound	Poor	Poor	Fair	---	---	Poor	Very poor	Very poor	Poor	Very poor	Very poor	Poor
KwUD:												
Konawa	Fair	Good	Good	---	---	Good	Very poor	Very poor	Good	---	Very poor	Good
Urban land.												
LarA:												
Lawrie	Good	Good	Fair	---	---	Good	Poor	Very poor	Good	---	Very poor	Fair
LatG:												
Latrass.												
LawA:												
Lawrie	Good	Good	Fair	---	---	Good	Poor	Very poor	Good	---	Very poor	Fair
LitB:												
Littleaxe	Good	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
LitC:												
Littleaxe	Good	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
LitC2:												
Littleaxe	Good	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
LomA:												
Lomill	Fair	Good	Fair	---	---	Good	Fair	Good	Fair	---	Fair	Fair
LtUC:												
Littleaxe	Good	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
Urban land.												
LweA:												
Lawrie	Good	Good	Fair	---	---	Good	Poor	Very poor	Good	---	Very poor	Fair
LwfA:												
Lawrie	Good	Good	Fair	---	---	Good	Poor	Very poor	Good	---	Very poor	Fair
LwUA:												
Lawrie	Good	Good	Fair	---	---	Good	Poor	Very poor	Good	---	Very poor	Fair
Urban land.												
MlfA:												
Miller	Good	Good	Good	---	---	Fair	Poor	Poor	Good	---	Poor	Fair
MllA:												
Miller	Fair	Fair	Poor	---	---	Poor	Poor	Poor	Fair	---	Poor	Poor
M-W:												
Miscellaneous water.												
NewB:												
Newalla	Good	Good	Good	---	---	Good	Very poor	Very poor	Good	---	Very poor	Good
NewC2:												
Newalla	Good	Good	Good	---	---	Good	Very poor	Very poor	Good	---	Very poor	Good
NorB:												
Norge	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
NorC:												
Norge	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
NorC2:												
Norge	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
NoUC:												
Norge	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
Urban land.												
PdHC:												
Piedmont	Fair	Good	Good	---	---	Poor	Poor	Very poor	Good	---	Very poor	Fair
Huska	Poor	Poor	Very poor	---	---	Poor	Poor	Very poor	Poor	---	Very poor	Very poor
PieC2:												
Piedmont	Fair	Good	Fair	---	---	Poor	Poor	Very poor	Fair	---	Very poor	Poor
PimB:												
Piedmont	Fair	Good	Good	---	---	Poor	Poor	Very poor	Good	---	Very poor	Fair
PimC:												
Piedmont	Fair	Good	Good	---	---	Poor	Poor	Very poor	Good	---	Very poor	Fair
PIT:												
Pits	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
PukA:												
Pulaski	Poor	Fair	Fair	---	---	Good	Poor	Very poor	Fair	---	Very poor	Fair
PulA:												
Pulaski	Good	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
RenB:												
Renfrow	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
RinB:												
Renthin	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
RnnB:												
Renthin	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
RnnC2:												
Renthin	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
RnUC:												
Renthin	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
Urban land.												

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
SDGD4:												
Stephenville	Fair	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
Darsil	Very poor	Poor	Poor	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Poor
Gullied land	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
SDND:												
Stephenville	Fair	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
Darsil	Very poor	Poor	Poor	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Poor
Newalla	Fair	Good	Good	---	---	Good	Very poor	Very poor	Good	---	Very poor	Good
SDND2:												
Stephenville	Fair	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
Darsil	Very poor	Poor	Poor	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Poor
Newalla	Fair	Good	Good	---	---	Good	Very poor	Very poor	Good	---	Very poor	Good
StDC:												
Stephenville	Fair	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
Darsil	Very poor	Poor	Poor	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Poor
StDC2:												
Stephenville	Fair	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
Darsil	Very poor	Poor	Poor	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Poor
StLC4:												
Stephenville	Fair	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
Littleaxe	Good	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
SUND:												
Stephenville	Fair	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
Urban land.												
Newalla	Fair	Good	Good	---	---	Good	Very poor	Very poor	Good	---	Very poor	Good

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
TevD:												
Teval	Fair	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
TevD2:												
Teval	Fair	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
TlrB:												
Teller	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
TlrC:												
Teller	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
TlrC2:												
Teller	Fair	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
TlrD:												
Teller	Fair	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
TlUD:												
Teller	Fair	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
Urban land.												
TriA:												
Tribbey	Poor	Fair	Fair	---	---	Good	Fair	Poor	Fair	---	Good	Fair
URB:												
Urban land.												
VanA:												
Vanoss	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
VanB:												
Vanoss	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
W:												
Water.												
WauA:												
Waurika	Fair	Good	Fair	---	---	Fair	Fair	Fair	Fair	---	Fair	Fair
WtgA:												
Watonga	Fair	Fair	Poor	---	---	Fair	Poor	Poor	Fair	---	Poor	Fair
WuUA:												
Watonga	Fair	Fair	Poor	---	---	Fair	Poor	Poor	Fair	---	Poor	Fair
Urban land.												
YaGA:												
Yahola	Good	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor	Good

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
YaGA:												
Gaddy	Fair	Good	Good	Fair	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor	Fair
YahA:												
Yahola	Good	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor	Good
YaUA:												
Yahola	Good	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor	Good
Urban land.												
ZanB:												
Zaneis	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
ZanC:												
Zaneis	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
ZanC2:												
Zaneis	Poor	Fair	Fair	---	---	Fair	Poor	Very poor	Fair	---	Very poor	Fair
ZaUC:												
Zaneis	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
Urban land.												

Recreation

The soils of the survey area are rated in the table "Recreational Development" according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites, and either access to public sewer lines or the capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degrees, for recreational uses by the duration of flooding and the season when it occurs. Onsite assessment of the height, duration, intensity, and frequency of flooding is essential in planning recreational facilities.

Camp areas are tracts of land used intensively as sites for tents, trailers, and campers and for outdoor activities that accompany such sites. These areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The soils are rated on the basis of soil properties that influence the ease of developing camp areas and performance of the areas after development. Also considered are the soil properties that influence trafficability and promote the growth of vegetation after heavy use.

Picnic areas are natural or landscaped tracts of land that are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The soils are rated on the basis of soil properties that influence the cost of shaping the site, trafficability, and the growth of vegetation after development. The surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry.

Playgrounds are areas used intensively for baseball, football, or similar activities. These areas require a nearly level soil that is free of stones and that can withstand heavy foot traffic and maintain an adequate cover of vegetation. The soils are rated on the basis of soil properties that influence the cost of shaping the site, trafficability, and the growth of vegetation. Slope and stoniness are the main concerns in developing playgrounds. The surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry.

Paths and trails are areas used for hiking and horseback riding. The areas should require little or no cutting and filling during site preparation. The soils are rated on the basis of soil properties that influence trafficability and erodibility. Paths and trails should remain firm under foot traffic and not be dusty when dry.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

The interpretive ratings in this table help engineers, planners, and others to understand how soil properties influence recreational uses. Ratings for proposed uses are given in terms of limitations. Only the most restrictive features are listed. Other features may limit a specific recreational use.

The degree of soil limitation is expressed as slight, moderate, or severe.

Slight means that soil properties are favorable for the rated use. The limitations are minor and can be easily overcome. Good performance and low maintenance are expected.

Moderate means that soil properties are moderately favorable for the rated use. The limitations can be overcome or modified by special planning, design, or maintenance. During some part of the year, the expected performance may be less desirable than that of soils rated slight.

Severe means that soil properties are unfavorable for the rated use. Examples of limitations are slope, bedrock near the surface, flooding, and a seasonal high water table. These limitations generally require

major soil reclamation, special design, or intensive maintenance. Overcoming the limitations generally is difficult and costly.

The information in the table “Recreational Development” can be supplemented by other information in this survey, for example, interpretations for dwellings without basements and for local roads and streets in the table “Building Site Development” and interpretations for septic tank absorption fields in the table “Sanitary Facilities.”

Recreational Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AhpA:					
Ashport	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
AmbE:					
Amber	Severe: flooding	Moderate: slope	Severe: slope	Severe: erodes easily	Moderate: slope
AshA:					
Asher	Severe: flooding	Slight	Slight	Slight	Slight
AspA:					
Ashport	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
AstA:					
Ashport	Severe: flooding	Moderate: flooding	Severe: flooding	Moderate: flooding	Severe: flooding
BetA:					
Bethany	Slight	Slight	Slight	Slight	Slight
BetB:					
Bethany	Slight	Slight	Moderate: slope	Slight	Slight
BeUB:					
Bethany	Slight	Slight	Moderate: slope	Slight	Slight
Urban land.					
CaaA:					
Canadian	Severe: flooding	Slight	Slight	Slight	Slight
CaUB:					
Canadian	Severe: flooding	Slight	Slight	Slight	Slight
Urban land.					
CoIC2:					
Coyle	Slight	Slight	Moderate: slope depth to rock	Severe: erodes easily	Moderate: depth to rock
Ironmound	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Slight	Severe: depth to rock
CoUB:					
Coyle	Slight	Slight	Moderate: slope depth to rock	Severe: erodes easily	Moderate: depth to rock
Urban land.					

Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CoyB:					
Coyle	Slight	Slight	Moderate: slope depth to rock	Severe: erodes easily	Moderate: depth to rock
DalA:					
Dale	Severe: flooding	Slight	Slight	Slight	Slight
DAM:					
Dams.					
DaUA:					
Dale	Severe: flooding	Slight	Slight	Slight	Slight
Urban land.					
DeDE:					
Derby	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope droughty
Dougherty	Moderate: slope too sandy	Moderate: slope too sandy	Severe: slope	Moderate: too sandy	Moderate: slope droughty
DerB:					
Derby	Slight	Slight	Slight	Slight	Moderate: droughty
DerE:					
Derby	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope droughty
DleA:					
Dale	Severe: flooding	Slight	Slight	Slight	Slight
DSRG:					
Darsil	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock droughty
Stephenville	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Rock outcrop.					
DUDE:					
Derby	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope droughty
Urban land.					
Dougherty	Moderate: slope too sandy	Moderate: slope too sandy	Severe: slope	Moderate: too sandy	Moderate: slope droughty

Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
EasA:					
Easpur	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
GaGA:					
Gaddy	Severe: flooding	Moderate: flooding	Severe: flooding	Moderate: flooding	Severe: flooding
Gracemore	Severe: flooding wetness	Severe: wetness	Severe: flooding wetness	Severe: wetness	Severe: flooding wetness droughty
GcmA:					
Gracemont	Severe: flooding percs slowly wetness	Severe: excess salt percs slowly wetness	Severe: flooding percs slowly wetness	Severe: too clayey wetness	Severe: excess salt flooding wetness
GmtA:					
Gracemont	Severe: flooding wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
GraC:					
Grainola	Slight	Slight	Moderate: slope small stones depth to rock	Severe: erodes easily	Moderate: large stones depth to rock
GrAD:					
Grainola	Slight	Slight	Severe: slope	Severe: erodes easily	Moderate: large stones depth to rock
Ashport	Severe: flooding	Moderate: flooding	Severe: flooding	Moderate: flooding	Severe: flooding
GrHC:					
Grant	Slight	Slight	Moderate: slope	Severe: erodes easily	Slight
Huska	Severe: excess sodium	Severe: excess sodium	Severe: excess sodium	Slight	Severe: excess sodium
GrIE:					
Grainola	Moderate: slope	Moderate: slope	Severe: slope	Severe: erodes easily	Moderate: large stones slope depth to rock
Ironmound	Severe: depth to rock	Severe: depth to rock	Severe: slope depth to rock	Slight	Severe: depth to rock
GrPB2:					
Grainola	Slight	Slight	Moderate: slope small stones depth to rock	Severe: erodes easily	Moderate: large stones depth to rock

Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GrPB2:					
Piedmont	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly slope depth to rock	Slight	Moderate: depth to rock
GrPC2:					
Grainola	Slight	Slight	Moderate: slope small stones depth to rock	Severe: erodes easily	Moderate: large stones depth to rock
Piedmont	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly slope depth to rock	Slight	Moderate: depth to rock
GUIE:					
Grainola	Moderate: slope	Moderate: slope	Severe: slope	Severe: erodes easily	Moderate: large stones slope depth to rock
Urban land.					
Ironmound	Severe: depth to rock	Severe: depth to rock	Severe: slope depth to rock	Slight	Severe: depth to rock
HarC:					
Harrah	Slight	Slight	Moderate: slope	Slight	Slight
HarC2:					
Harrah	Slight	Slight	Moderate: slope	Slight	Slight
HarC4:					
Harrah	Slight	Slight	Moderate: slope	Slight	Slight
HarG:					
Harrah	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
HaUC:					
Harrah	Slight	Slight	Moderate: slope	Slight	Slight
Urban land.					
HiLA:					
Hibsaw	Severe: excess sodium flooding ponding	Severe: excess sodium excess salt ponding	Severe: excess sodium excess salt ponding	Severe: ponding	Severe: excess sodium excess salt ponding
Lomill	Severe: flooding	Moderate: percs slowly	Moderate: flooding percs slowly	Slight	Moderate: flooding

Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
IrCE:					
Ironmound	Severe: depth to rock	Severe: depth to rock	Severe: slope depth to rock	Slight	Severe: depth to rock
Coyle	Moderate: slope	Moderate: slope	Severe: slope	Severe: erodes easily	Moderate: slope depth to rock
IrKD:					
Ironmound	Severe: depth to rock	Severe: depth to rock	Severe: slope depth to rock	Slight	Severe: depth to rock
Kingfisher	Slight	Slight	Severe: slope	Severe: erodes easily	Moderate: depth to rock
KekA:					
Keokuk	Severe: flooding	Slight	Slight	Slight	Slight
KeoA:					
Keokuk	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
KeUA:					
Keokuk	Severe: flooding	Slight	Slight	Slight	Slight
Urban land.					
KgIC:					
Kingfisher	Slight	Slight	Moderate: slope depth to rock	Severe: erodes easily	Moderate: depth to rock
Ironmound	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Slight	Severe: depth to rock
KowB:					
Konawa	Slight	Slight	Moderate: slope	Slight	Slight
KowD:					
Konawa	Slight	Slight	Severe: slope	Slight	Slight
KowD2:					
Konawa	Slight	Slight	Severe: slope	Slight	Slight
KowD4:					
Konawa	Slight	Slight	Severe: slope	Slight	Slight
KrdA:					
Kirkland	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly	Slight	Slight
KrUA:					
Kirkland	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly	Slight	Slight

Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
KrUA:					
Urban land.					
KUIC:					
Kingfisher	Slight	Slight	Moderate: slope depth to rock	Severe: erodes easily	Moderate: depth to rock
Urban land.					
Ironmound	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Slight	Severe: depth to rock
KwUD:					
Konawa	Slight	Slight	Severe: slope	Slight	Slight
Urban land.					
LarA:					
Lawrie	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
LatG:					
Latrass	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily slope	Severe: slope
LawA:					
Lawrie	Severe: flooding	Slight	Slight	Slight	Slight
LitB:					
Littleaxe	Slight	Slight	Moderate: slope	Slight	Slight
LitC:					
Littleaxe	Slight	Slight	Moderate: slope	Slight	Slight
LitC2:					
Littleaxe	Slight	Slight	Moderate: slope	Slight	Slight
LomA:					
Lomill	Severe: flooding	Moderate: percs slowly	Moderate: flooding percs slowly	Slight	Moderate: flooding
LtUC:					
Littleaxe	Slight	Slight	Moderate: slope	Slight	Slight
Urban land.					
LweA:					
Lawrie	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
LwfA:					
Lawrie	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding

Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
LwUA:					
Lawrie	Severe: flooding	Slight	Slight	Slight	Slight
Urban land.					
MlfA:					
Miller	Severe: flooding	Moderate: percs slowly	Moderate: flooding percs slowly	Slight	Moderate: flooding
MllA:					
Miller	Severe: flooding	Moderate: percs slowly too clayey	Moderate: flooding percs slowly too clayey	Moderate: too clayey	Severe: too clayey
M-W:					
Miscellaneous water.					
NewB:					
Newalla	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly slope	Severe: erodes easily	Slight
NewC2:					
Newalla	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly slope	Severe: erodes easily	Slight
NorB:					
Norge	Slight	Slight	Moderate: slope	Slight	Slight
NorC:					
Norge	Slight	Slight	Moderate: slope	Slight	Slight
NorC2:					
Norge	Slight	Slight	Moderate: slope	Slight	Slight
NoUC:					
Norge	Slight	Slight	Moderate: slope	Slight	Slight
Urban land.					
PdHC:					
Piedmont	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly slope depth to rock	Slight	Moderate: depth to rock
Huska	Severe: excess sodium	Severe: excess sodium	Severe: excess sodium	Slight	Severe: excess sodium
PieC2:					
Piedmont	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly slope depth to rock	Slight	Moderate: depth to rock

Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
PimB:					
Piedmont	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly slope depth to rock	Slight	Moderate: depth to rock
PimC:					
Piedmont	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly slope depth to rock	Slight	Moderate: depth to rock
PIT:					
Pits.					
PukA:					
Pulaski	Severe: flooding	Moderate: flooding	Severe: flooding	Moderate: flooding	Severe: flooding
PulA:					
Pulaski	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
RenB:					
Renfrow	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly slope	Slight	Slight
RinB:					
Renthin	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly slope	Slight	Slight
RnnB:					
Renthin	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly slope	Slight	Slight
RnnC2:					
Renthin	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly slope	Slight	Slight
RnUC:					
Renthin	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly slope	Slight	Slight
Urban land.					
SDGD4:					
Stephenville	Slight	Slight	Severe: slope	Slight	Moderate: large stones depth to rock
Darsil	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Moderate: too sandy	Severe: depth to rock droughty
Gullied land.					

Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
SDND:					
Stephenville-----------	Slight	Slight	Severe: slope	Slight	Moderate: large stones depth to rock
Darsil-----------------	Severe: depth to rock	Severe: depth to rock	Severe: slope depth to rock	Moderate: too sandy	Severe: depth to rock droughty
Newalla----------------	Moderate: percs slowly	Moderate: percs slowly	Severe: slope	Severe: erodes easily	Slight
SDND2:					
Stephenville-----------	Slight	Slight	Severe: slope	Slight	Moderate: large stones depth to rock
Darsil-----------------	Severe: depth to rock	Severe: depth to rock	Severe: slope depth to rock	Moderate: too sandy	Severe: depth to rock droughty
Newalla----------------	Moderate: percs slowly	Moderate: percs slowly	Severe: slope	Severe: erodes easily	Slight
StDC:					
Stephenville-----------	Slight	Slight	Moderate: slope small stones depth to rock	Slight	Moderate: large stones depth to rock
Darsil-----------------	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Moderate: too sandy	Severe: depth to rock droughty
StDC2:					
Stephenville-----------	Slight	Slight	Moderate: slope small stones depth to rock	Slight	Moderate: large stones depth to rock
Darsil-----------------	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Moderate: too sandy	Severe: depth to rock droughty
StLC4:					
Stephenville-----------	Slight	Slight	Moderate: slope small stones depth to rock	Slight	Moderate: large stones depth to rock
Littleaxe--------------	Slight	Slight	Moderate: slope	Slight	Slight
SUND:					
Stephenville-----------	Slight	Slight	Severe: slope	Slight	Moderate: large stones depth to rock
Urban land.					
Newalla----------------	Moderate: percs slowly	Moderate: percs slowly	Severe: slope	Severe: erodes easily	Slight

Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
TevD:					
Teval	Slight	Slight	Severe: slope	Slight	Slight
TevD2:					
Teval	Slight	Slight	Severe: slope	Slight	Slight
TlrB:					
Teller	Slight	Slight	Moderate: slope	Slight	Slight
TlrC:					
Teller	Slight	Slight	Moderate: slope	Slight	Slight
TlrC2:					
Teller	Slight	Slight	Moderate: slope	Slight	Slight
TlrD:					
Teller	Slight	Slight	Severe: slope	Slight	Slight
TlUD:					
Teller	Slight	Slight	Severe: slope	Slight	Slight
Urban land.					
TriA:					
Tribbey	Severe: flooding wetness	Severe: wetness	Severe: flooding wetness	Severe: wetness	Severe: flooding wetness
URB:					
Urban land.					
VanA:					
Vanoss	Slight	Slight	Slight	Slight	Slight
VanB:					
Vanoss	Slight	Slight	Moderate: slope	Slight	Slight
W:					
Water.					
WauA:					
Waurika	Severe: percs slowly wetness	Severe: percs slowly	Severe: percs slowly wetness	Moderate: wetness	Moderate: wetness
WtgA:					
Watonga	Severe: flooding	Moderate: percs slowly too clayey	Moderate: percs slowly too clayey	Moderate: too clayey	Severe: too clayey
WuUA:					
Watonga	Severe: flooding	Moderate: percs slowly too clayey	Moderate: percs slowly too clayey	Moderate: too clayey	Severe: too clayey

Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
WuUA:					
Urban land.					
YaGA:					
Yahola-----------------	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
Gaddy------------------	Severe: flooding	---	Moderate: flooding	---	Moderate: flooding droughty
YahA:					
Yahola-----------------	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
YaUA:					
Yahola-----------------	Severe: flooding	Slight	Slight	Slight	Slight
Urban land.					
ZanB:					
Zaneis-----------------	Slight	Slight	Moderate: slope	Slight	Slight
ZanC:					
Zaneis-----------------	Slight	Slight	Moderate: slope	Slight	Slight
ZanC2:					
Zaneis-----------------	Slight	Slight	Moderate: slope	Slight	Slight
ZaUC:					
Zaneis-----------------	Slight	Slight	Moderate: slope	Slight	Slight
Urban land.					

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for sanitary facilities, building site development, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading “Soil Properties.”

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Sanitary Facilities

The table “Sanitary Facilities” shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. It also shows the suitability of the soils for use as a daily cover for landfill.

Soil properties are important in selecting sites for sanitary facilities and in identifying limiting soil properties and site features to be considered in planning, design, and installation. Soil limitation ratings of *slight, moderate,* or *severe* are given for septic tank absorption fields, sewage lagoons, and trench and area sanitary landfills. Soil suitability ratings of *good, fair,* and *poor* are given for daily cover for landfill.

A rating of *slight* or *good* indicates that the soils have no limitations or that the limitations can be easily overcome. Good performance and low maintenance can be expected. A rating of *moderate* or *fair* indicates that the limitations should be recognized but generally can be overcome by good management or special

design. A rating of *severe* or *poor* indicates that overcoming the limitations is difficult or impractical. Increased maintenance may be required.

Septic tank absorption fields are areas in which subsurface systems of tile or perforated pipe distribute effluent from a septic tank into the natural soil. The centerline of the tile is assumed to be at a depth of 24 inches. Only the part of the soil between depths of 24 and 60 inches is considered in making the ratings. The soil properties and site features considered are those that affect the absorption of the effluent, those that affect the construction and maintenance of the system, and those that may affect public health.

The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow or excessively rapid absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted, relatively impervious soil material. Aerobic lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Relatively impervious soil material for the lagoon floor and sides is desirable to minimize seepage and contamination of local ground water.

The table gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Trench sanitary landfill is an area where solid waste is disposed of by placing refuse in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil that is excavated from the trench. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. Soil properties that influence the risk of pollution, the ease of excavation, trafficability, and revegetation are the major considerations in rating the soils.

Area sanitary landfill is an area where solid waste is disposed of by placing refuse in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil that is imported from a source away from the site. A final cover of soil at least 2 feet thick is placed over the completed landfill. Soil properties that influence trafficability, revegetation, and the risk of pollution are the main considerations in rating the soils for area sanitary landfills.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. The ratings in the table are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The suitability of a soil for use as cover is based on properties that affect workability and the ease of digging, moving, and spreading the material over the refuse daily during both wet and dry periods.

Soil texture, wetness, rock fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best

cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AhpA:					
Ashport	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Fair: too clayey
AmbE:					
Amber	Moderate: flooding percs slowly slope	Severe: slope	Moderate: flooding slope	Moderate: flooding slope	Fair: slope
AshA:					
Asher	Moderate: flooding percs slowly	Moderate: seepage	Moderate: flooding too clayey too sandy	Moderate: flooding	Fair: too clayey
AspA:					
Ashport	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Fair: too clayey
AstA:					
Ashport	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Fair: too clayey
BetA:					
Bethany	Severe: percs slowly	Moderate: seepage	Severe: too clayey	Slight	Poor: hard to pack too clayey
BetB:					
Bethany	Severe: percs slowly	Moderate: seepage slope	Severe: too clayey	Slight	Poor: hard to pack too clayey
BeUB:					
Bethany	Severe: percs slowly	Moderate: seepage slope	Severe: too clayey	Slight	Poor: hard to pack too clayey
Urban land.					
CaaA:					
Canadian	Moderate: flooding	Severe: seepage	Severe: seepage	Severe: seepage	Good
CaUB:					
Canadian	Moderate: flooding	Severe: seepage	Severe: seepage	Severe: seepage	Good
Urban land.					
CoIC2:					
Coyle	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
Ironmound	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock

Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CoUB:					
Coyle------------------	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
Urban land.					
CoyB:					
Coyle------------------	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
DalA:					
Dale-------------------	Moderate: flooding percs slowly	Moderate: seepage	Moderate: flooding too clayey	Moderate: flooding	Fair: too clayey
DAM:					
Dams.					
DaUA:					
Dale-------------------	Moderate: flooding percs slowly	Moderate: seepage	Moderate: flooding too clayey	Moderate: flooding	Fair: too clayey
Urban land.					
DeDE:					
Derby------------------	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
Dougherty--------------	Moderate: percs slowly slope	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
DerB:					
Derby------------------	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
DerE:					
Derby------------------	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
DleA:					
Dale-------------------	Moderate: flooding percs slowly	Moderate: seepage	Moderate: flooding too clayey	Moderate: flooding	Fair: too clayey
DSRG:					
Darsil-----------------	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: slope depth to rock	Poor: seepage too sandy depth to rock
Stephenville-----------	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
Rock outcrop.					

Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
DUDE:					
Derby	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
Urban land.					
Dougherty	Moderate: percs slowly slope	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
EasA:					
Easpur	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Fair: too clayey
GaGA:					
Gaddy	Severe: flooding poor filter	Severe: flooding seepage	Severe: flooding seepage too sandy	Severe: flooding seepage	Poor: seepage too sandy
Gracemore	Severe: flooding wetness poor filter	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Poor: seepage too sandy wetness
GcmA:					
Gracemont	Severe: flooding wetness poor filter	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Poor: wetness
GmtA:					
Gracemont	Severe: flooding wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Poor: wetness
GraC:					
Grainola	Severe: percs slowly depth to rock	Severe: depth to rock	Severe: too clayey depth to rock	Severe: depth to rock	Poor: hard to pack too clayey depth to rock
GrAD:					
Grainola	Severe: percs slowly depth to rock	Severe: depth to rock	Severe: too clayey depth to rock	Severe: depth to rock	Poor: hard to pack too clayey depth to rock
Ashport	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Fair: too clayey
GrHC:					
Grant	Moderate: percs slowly depth to rock	Moderate: seepage slope depth to rock	Severe: depth to rock	Moderate: depth to rock	Fair: too clayey depth to rock

Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GrHC:					
Huska	Severe: percs slowly	Moderate: slope depth to rock	Severe: excess sodium too clayey depth to rock	Moderate: depth to rock	Poor: excess sodium hard to pack too clayey
GrIE:					
Grainola	Severe: percs slowly depth to rock	Severe: slope depth to rock	Severe: too clayey depth to rock	Severe: depth to rock	Poor: hard to pack too clayey depth to rock
Ironmound	Severe: depth to rock	Severe: slope depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
GrPB2:					
Grainola	Severe: percs slowly depth to rock	Severe: depth to rock	Severe: too clayey depth to rock	Severe: depth to rock	Poor: hard to pack too clayey depth to rock
Piedmont	Severe: percs slowly depth to rock	Severe: depth to rock	Severe: too clayey depth to rock	Severe: depth to rock	Poor: hard to pack too clayey depth to rock
GrPC2:					
Grainola	Severe: percs slowly depth to rock	Severe: depth to rock	Severe: too clayey depth to rock	Severe: depth to rock	Poor: hard to pack too clayey depth to rock
Piedmont	Severe: percs slowly depth to rock	Severe: depth to rock	Severe: too clayey depth to rock	Severe: depth to rock	Poor: hard to pack too clayey depth to rock
GUIE:					
Grainola	Severe: percs slowly depth to rock	Severe: slope depth to rock	Severe: too clayey depth to rock	Severe: depth to rock	Poor: hard to pack too clayey depth to rock
Urban land.					
Ironmound	Severe: depth to rock	Severe: slope depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
HarC:					
Harrah	Moderate: percs slowly	Severe: seepage	Slight	Slight	Good
HarC2:					
Harrah	Moderate: percs slowly	Severe: seepage	Slight	Slight	Good
HarC4:					
Harrah	Moderate: percs slowly	Severe: seepage	Slight	Slight	Good

Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HarG:					
Harrah	Severe: slope	Severe: seepage slope	Severe: slope	Severe: slope	Poor: slope
HaUC:					
Harrah	Moderate: percs slowly	Severe: seepage	Slight	Slight	Good
Urban land.					
HiLA:					
Hibsaw	Severe: flooding percs slowly ponding	Severe: flooding seepage ponding	Severe: flooding too clayey ponding	Severe: flooding seepage ponding	Poor: excess sodium too clayey ponding
Lomill	Severe: flooding percs slowly wetness	Severe: flooding seepage	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Poor: too clayey
IrCE:					
Ironmound	Severe: depth to rock	Severe: slope depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
Coyle	Severe: depth to rock	Severe: slope depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
IrKD:					
Ironmound	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
Kingfisher	Severe: percs slowly depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
KekA:					
Keokuk	Moderate: flooding percs slowly	Moderate: seepage	Moderate: flooding too sandy	Moderate: flooding	Good
KeoA:					
Keokuk	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Good
KeUA:					
Keokuk	Moderate: flooding percs slowly	Moderate: seepage	Moderate: flooding too sandy	Moderate: flooding	Good
Urban land.					
KgIC:					
Kingfisher	Severe: percs slowly depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
Ironmound	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock

Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
KowB:					
Konawa-----------------	Moderate: percs slowly	Severe: seepage	Severe: seepage	Severe: seepage	Good
KowD:					
Konawa-----------------	Moderate: percs slowly	Severe: seepage	Severe: seepage	Severe: seepage	Good
KowD2:					
Konawa-----------------	Moderate: percs slowly	Severe: seepage	Severe: seepage	Severe: seepage	Good
KowD4:					
Konawa-----------------	Moderate: percs slowly	Severe: seepage	Severe: seepage	Severe: seepage	Good
KrdA:					
Kirkland---------------	Severe: percs slowly	Slight	Severe: too clayey depth to rock	Slight	Poor: hard to pack too clayey
KrUA:					
Kirkland---------------	Severe: percs slowly	Slight	Severe: too clayey depth to rock	Slight	Poor: hard to pack too clayey
Urban land.					
KUIC:					
Kingfisher-------------	Severe: percs slowly depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
Urban land.					
Ironmound--------------	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
KwUD:					
Konawa-----------------	Moderate: percs slowly	Severe: seepage	Severe: seepage	Severe: seepage	Good
Urban land.					
LarA:					
Lawrie-----------------	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Fair: too clayey
LatG:					
Latrass----------------	Severe: percs slowly slope	Severe: slope	Severe: slope too clayey	Severe: slope	Poor: hard to pack slope too clayey
LawA:					
Lawrie-----------------	Moderate: flooding percs slowly	Moderate: seepage	Moderate: flooding too clayey	Moderate: flooding	Fair: too clayey

Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
LitB:					
Littleaxe	Moderate: percs slowly depth to rock	Severe: seepage	Severe: seepage depth to rock	Severe: seepage	Fair: thin layer depth to rock
LitC:					
Littleaxe	Moderate: percs slowly depth to rock	Severe: seepage	Severe: seepage depth to rock	Severe: seepage	Fair: thin layer depth to rock
LitC2:					
Littleaxe	Moderate: percs slowly depth to rock	Severe: seepage	Severe: seepage depth to rock	Severe: seepage	Fair: thin layer depth to rock
LomA:					
Lomill	Severe: flooding percs slowly wetness	Severe: flooding seepage	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Poor: too clayey
LtUC:					
Littleaxe	Moderate: percs slowly depth to rock	Severe: seepage	Severe: seepage depth to rock	Severe: seepage	Fair: thin layer depth to rock
Urban land.					
LweA:					
Lawrie	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Fair: too clayey
LwfA:					
Lawrie	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Fair: too clayey
LwUA:					
Lawrie	Moderate: flooding percs slowly	Moderate: seepage	Moderate: flooding too clayey	Moderate: flooding	Fair: too clayey
Urban land.					
MlfA:					
Miller	Severe: flooding percs slowly	Severe: flooding seepage	Severe: flooding too clayey	Severe: flooding	Poor: hard to pack too clayey
MllA:					
Miller	Severe: flooding percs slowly	Severe: flooding	Severe: flooding too clayey	Severe: flooding	Poor: hard to pack too clayey
M-W:					
Miscellaneous water.					
NewB:					
Newalla	Severe: percs slowly	Moderate: slope depth to rock	Severe: too clayey depth to rock	Moderate: depth to rock	Poor: hard to pack too clayey

Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
NewC2:					
Newalla	Severe: percs slowly	Moderate: slope depth to rock	Severe: too clayey depth to rock	Moderate: depth to rock	Poor: hard to pack too clayey
NorB:					
Norge	Severe: percs slowly	Moderate: seepage slope	Moderate: too clayey	Slight	Fair: thin layer too clayey
NorC:					
Norge	Severe: percs slowly	Moderate: seepage slope	Moderate: too clayey	Slight	Fair: thin layer too clayey
NorC2:					
Norge	Severe: percs slowly	Moderate: seepage slope	Moderate: too clayey	Slight	Fair: thin layer too clayey
NoUC:					
Norge	Severe: percs slowly	Moderate: seepage slope	Moderate: too clayey	Slight	Fair: thin layer too clayey
Urban land.					
PdHC:					
Piedmont	Severe: percs slowly depth to rock	Severe: depth to rock	Severe: too clayey depth to rock	Severe: depth to rock	Poor: hard to pack too clayey depth to rock
Huska	Severe: percs slowly	Moderate: slope depth to rock	Severe: excess sodium too clayey depth to rock	Moderate: depth to rock	Poor: excess sodium hard to pack too clayey
PieC2:					
Piedmont	Severe: percs slowly depth to rock	Severe: depth to rock	Severe: too clayey depth to rock	Severe: depth to rock	Poor: hard to pack too clayey depth to rock
PimB:					
Piedmont	Severe: percs slowly depth to rock	Severe: depth to rock	Severe: too clayey depth to rock	Severe: depth to rock	Poor: hard to pack too clayey depth to rock
PimC:					
Piedmont	Severe: percs slowly depth to rock	Severe: depth to rock	Severe: too clayey depth to rock	Severe: depth to rock	Poor: hard to pack too clayey depth to rock
PIT:					
Pits.					

Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
PukA:					
Pulaski----------------	Severe: flooding	Severe: flooding seepage	Severe: flooding seepage	Severe: flooding seepage	Good
PulA:					
Pulaski----------------	Severe: flooding	Severe: flooding seepage	Severe: flooding seepage	Severe: flooding seepage	Good
RenB:					
Renfrow----------------	Severe: percs slowly	Moderate: slope	Severe: too clayey	Slight	Poor: hard to pack too clayey
RinB:					
Renthin----------------	Severe: percs slowly	Moderate: slope depth to rock	Severe: too clayey depth to rock	Moderate: depth to rock	Poor: hard to pack too clayey
RnnB:					
Renthin----------------	Severe: percs slowly	Moderate: slope depth to rock	Severe: too clayey depth to rock	Moderate: depth to rock	Poor: hard to pack too clayey
RnnC2:					
Renthin----------------	Severe: percs slowly	Moderate: slope depth to rock	Severe: too clayey depth to rock	Moderate: depth to rock	Poor: hard to pack too clayey
RnUC:					
Renthin----------------	Severe: percs slowly	Moderate: slope depth to rock	Severe: too clayey depth to rock	Moderate: depth to rock	Poor: hard to pack too clayey
Urban land.					
SDGD4:					
Stephenville-----------	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
Darsil-----------------	Severe: depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Severe: depth to rock	Poor: seepage too sandy depth to rock
Gullied land.					
SDND:					
Stephenville-----------	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
Darsil-----------------	Severe: depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Severe: depth to rock	Poor: seepage too sandy depth to rock
Newalla----------------	Severe: percs slowly	Moderate: slope depth to rock	Severe: too clayey depth to rock	Moderate: depth to rock	Poor: hard to pack too clayey

Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
SDND2:					
Stephenville	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
Darsil	Severe: depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Severe: depth to rock	Poor: seepage too sandy depth to rock
Newalla	Severe: percs slowly	Moderate: slope depth to rock	Severe: too clayey depth to rock	Moderate: depth to rock	Poor: hard to pack too clayey
StDC:					
Stephenville	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
Darsil	Severe: depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Severe: depth to rock	Poor: seepage too sandy depth to rock
StDC2:					
Stephenville	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
Darsil	Severe: depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Severe: depth to rock	Poor: seepage too sandy depth to rock
StLC4:					
Stephenville	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
Littleaxe	Moderate: percs slowly depth to rock	Severe: seepage	Severe: seepage depth to rock	Severe: seepage	Fair: thin layer depth to rock
SUND:					
Stephenville	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
Urban land.					
Newalla	Severe: percs slowly	Moderate: slope depth to rock	Severe: too clayey depth to rock	Moderate: depth to rock	Poor: hard to pack too clayey
TevD:					
Teval	Severe: poor filter	Severe: seepage	Severe: seepage	Severe: seepage	Poor: thin layer
TevD2:					
Teval	Severe: poor filter	Severe: seepage	Severe: seepage	Severe: seepage	Poor: thin layer
TlrB:					
Teller	Moderate: percs slowly	Severe: seepage	Severe: seepage	Slight	Fair: too clayey

Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
TlrC:					
Teller	Moderate: percs slowly	Severe: seepage	Severe: seepage	Slight	Fair: too clayey
TlrC2:					
Teller	Moderate: percs slowly	Severe: seepage	Severe: seepage	Slight	Fair: too clayey
TlrD:					
Teller	Moderate: percs slowly	Severe: seepage	Severe: seepage	Slight	Fair: too clayey
TlUD:					
Teller	Moderate: percs slowly	Severe: seepage	Severe: seepage	Slight	Fair: too clayey
Urban land.					
TriA:					
Tribbey	Severe: flooding wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Poor: wetness
URB:					
Urban land.					
VanA:					
Vanoss	Moderate: percs slowly	Moderate: seepage	Moderate: too clayey	Slight	Fair: too clayey
VanB:					
Vanoss	Moderate: percs slowly	Moderate: seepage slope	Moderate: too clayey	Slight	Fair: too clayey
W:					
Water.					
WauA:					
Waurika	Severe: percs slowly wetness	Slight	Severe: too clayey wetness	Severe: wetness	Poor: hard to pack too clayey wetness
WtgA:					
Watonga	Severe: percs slowly	Slight	Severe: too clayey	Moderate: flooding	Poor: hard to pack too clayey
WuUA:					
Watonga	Severe: percs slowly	Slight	Severe: too clayey	Moderate: flooding	Poor: hard to pack too clayey
Urban land.					
YaGA:					
Yahola	Severe: flooding	Severe: flooding seepage	Severe: flooding seepage	Severe: flooding seepage	Good

Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
YaGA:					
Gaddy------------------	Severe: flooding poor filter	Severe: flooding seepage	Severe: flooding seepage too sandy	Severe: flooding seepage	Poor: seepage too sandy
YahA:					
Yahola-----------------	Severe: flooding	Severe: flooding seepage	Severe: flooding seepage	Severe: flooding seepage	Good
YaUA:					
Yahola-----------------	Moderate: flooding	Severe: seepage	Severe: seepage	Severe: seepage	Good
Urban land.					
ZanB:					
Zaneis-----------------	Severe: percs slowly	Moderate: seepage slope depth to rock	Severe: depth to rock	Moderate: depth to rock	Fair: thin layer too clayey depth to rock
ZanC:					
Zaneis-----------------	Severe: percs slowly	Moderate: seepage slope depth to rock	Severe: depth to rock	Moderate: depth to rock	Fair: thin layer too clayey depth to rock
ZanC2:					
Zaneis-----------------	Severe: percs slowly	Moderate: seepage slope depth to rock	Severe: depth to rock	Moderate: depth to rock	Fair: thin layer too clayey depth to rock
ZaUC:					
Zaneis-----------------	Severe: percs slowly	Moderate: seepage slope depth to rock	Severe: depth to rock	Moderate: depth to rock	Fair: thin layer too clayey depth to rock
Urban land.					

Building Site Development

The table “Building Site Development” shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills generally are limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, potential for frost action, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 60 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AhpA:						
Ashport	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding low strength	Moderate: flooding
AmbE:						
Amber	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding slope	Moderate: flooding slope	Moderate: slope
AshA:						
Asher	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding	Slight
AspA:						
Ashport	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding low strength	Moderate: flooding
AstA:						
Ashport	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding low strength	Severe: flooding
BetA:						
Bethany	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Slight
BetB:						
Bethany	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Slight
BeUB:						
Bethany	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Slight
Urban land.						
CaaA:						
Canadian	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding	Slight
CaUB:						
Canadian	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding	Slight
Urban land.						
CoIC2:						
Coyle	Moderate: dense layer depth to rock	Slight	Moderate: depth to rock	Moderate: slope	Moderate: low strength	Moderate: depth to rock

Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CoIC2:						
Ironmound	Severe: depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: slope depth to rock	Moderate: depth to rock	Severe: depth to rock
CoUB:						
Coyle	Moderate: dense layer depth to rock	Slight	Moderate: depth to rock	Slight	Moderate: low strength	Moderate: depth to rock
Urban land.						
CoyB:						
Coyle	Moderate: dense layer depth to rock	Slight	Moderate: depth to rock	Slight	Moderate: low strength	Moderate: depth to rock
DalA:						
Dale	Slight	Severe: flooding	Severe: flooding	Severe: flooding	Severe: low strength	Slight
DAM:						
Dams						
DaUA:						
Dale	Slight	Severe: flooding	Severe: flooding	Severe: flooding	Severe: low strength	Slight
Urban land.						
DeDE:						
Derby	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope droughty
Dougherty	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope droughty
DerB:						
Derby	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: droughty
DerE:						
Derby	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope droughty
DleA:						
Dale	Slight	Severe: flooding	Severe: flooding	Severe: flooding	Severe: low strength	Slight
DSRG:						
Darsil	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: slope depth to rock droughty
Stephenville	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop.						

Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
DUDE:						
Derby	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope droughty
Urban land.						
Dougherty	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope droughty
EasA:						
Easpur	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding
GaGA:						
Gaddy	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding
Gracemore	Severe: wetness cutbanks cave	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness droughty
GcmA:						
Gracemont	Severe: wetness cutbanks cave	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: excess salt flooding wetness
GmtA:						
Gracemont	Severe: wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: wetness
GraC:						
Grainola	Moderate: too clayey depth to rock	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: large stones depth to rock
GrAD:						
Grainola	Moderate: too clayey depth to rock	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: large stones depth to rock
Ashport	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding low strength	Severe: flooding
GrHC:						
Grant	Moderate: dense layer	Slight	Slight	Moderate: slope	Severe: low strength	Slight
Huska	Moderate: too clayey dense layer	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: excess sodium
GrIE:						
Grainola	Moderate: slope too clayey depth to rock	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell slope	Severe: low strength shrink-swell	Moderate: large stones slope depth to rock

Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
GrIE:						
Ironmound	Severe: depth to rock	Moderate: slope depth to rock	Severe: depth to rock	Severe: slope	Moderate: slope depth to rock	Severe: depth to rock
GrPB2:						
Grainola	Moderate: too clayey depth to rock	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: large stones depth to rock
Piedmont	Moderate: too clayey dense layer depth to rock	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: depth to rock
GrPC2:						
Grainola	Moderate: too clayey depth to rock	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: large stones depth to rock
Piedmont	Moderate: too clayey dense layer depth to rock	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: depth to rock
GUIE:						
Grainola	Moderate: slope too clayey depth to rock	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell slope	Severe: low strength shrink-swell	Moderate: large stones slope depth to rock
Urban land.						
Ironmound	Severe: depth to rock	Moderate: slope depth to rock	Severe: depth to rock	Severe: slope	Moderate: slope depth to rock	Severe: depth to rock
HarC:						
Harrah	Slight	Slight	Slight	Moderate: slope	Slight	Slight
HarC2:						
Harrah	Slight	Slight	Slight	Moderate: slope	Slight	Slight
HarC4:						
Harrah	Slight	Slight	Slight	Moderate: slope	Slight	Slight
HarG:						
Harrah	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
HaUC:						
Harrah	Slight	Slight	Slight	Moderate: slope	Slight	Slight
Urban land.						

Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HiLA:						
Hibsaw	Severe: ponding cutbanks cave	Severe: flooding ponding	Severe: flooding ponding	Severe: flooding ponding	Severe: flooding low strength ponding	Severe: excess sodium excess salt ponding
Lomill	Severe: cutbanks cave	Severe: flooding shrink-swell	Severe: flooding	Severe: flooding shrink-swell	Severe: flooding low strength shrink-swell	Moderate: flooding
IrCE:						
Ironmound	Severe: depth to rock	Moderate: slope depth to rock	Severe: depth to rock	Severe: slope	Moderate: slope depth to rock	Severe: depth to rock
Coyle	Moderate: slope dense layer depth to rock	Moderate: slope	Moderate: slope depth to rock	Severe: slope	Moderate: low strength slope	Moderate: slope depth to rock
IrKD:						
Ironmound	Severe: depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: slope depth to rock	Moderate: depth to rock	Severe: depth to rock
Kingfisher	Moderate: too clayey dense layer depth to rock	Moderate: shrink-swell	Moderate: shrink-swell depth to rock	Moderate: shrink-swell slope	Severe: low strength	Moderate: depth to rock
KekA:						
Keokuk	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding	Slight
KeoA:						
Keokuk	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding
KeUA:						
Keokuk	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding	Slight
Urban land.						
KgIC:						
Kingfisher	Moderate: too clayey dense layer depth to rock	Moderate: shrink-swell	Moderate: shrink-swell depth to rock	Moderate: shrink-swell slope	Severe: low strength	Moderate: depth to rock
Ironmound	Severe: depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: depth to rock	Moderate: depth to rock	Severe: depth to rock
KowB:						
Konawa	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Slight
KowD:						
Konawa	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Slight	Slight

Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
KowD2:						
Konawa	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Slight	Slight
KowD4:						
Konawa	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Slight	Slight
KrdA:						
Kirkland	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Slight
KrUA:						
Kirkland	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Slight
Urban land.						
KUIC:						
Kingfisher	Moderate: too clayey dense layer depth to rock	Moderate: shrink-swell	Moderate: shrink-swell depth to rock	Moderate: shrink-swell slope	Severe: low strength	Moderate: depth to rock
Urban land.						
Ironmound	Severe: depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: depth to rock	Moderate: depth to rock	Severe: depth to rock
KwUD:						
Konawa	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Slight	Slight
Urban land.						
LarA:						
Lawrie	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding low strength	Moderate: flooding
LatG:						
Latrass	Severe: slope	Severe: shrink-swell slope	Severe: shrink-swell slope	Severe: shrink-swell slope	Severe: low strength shrink-swell slope	Severe: slope
LawA:						
Lawrie	Slight	Severe: flooding	Severe: flooding	Severe: flooding	Severe: low strength	Slight
LitB:						
Littleaxe	Moderate: dense layer	Slight	Slight	Slight	Slight	Slight
LitC:						
Littleaxe	Moderate: dense layer	Slight	Slight	Moderate: slope	Slight	Slight

Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
LitC2:						
Littleaxe	Moderate: dense layer	Slight	Slight	Moderate: slope	Slight	Slight
LomA:						
Lomill	Severe: cutbanks cave	Severe: flooding shrink-swell	Severe: flooding	Severe: flooding shrink-swell	Severe: flooding low strength shrink-swell	Moderate: flooding
LtUC:						
Littleaxe	Moderate: dense layer	Slight	Slight	Moderate: slope	Slight	Slight
Urban land.						
LweA:						
Lawrie	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding low strength	Moderate: flooding
LwfA:						
Lawrie	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding low strength	Moderate: flooding
LwUA:						
Lawrie	Slight	Severe: flooding	Severe: flooding	Severe: flooding	Severe: low strength	Slight
Urban land.						
MlfA:						
Miller	Moderate: flooding too clayey	Severe: flooding shrink-swell	Severe: flooding shrink-swell	Severe: flooding shrink-swell	Severe: flooding low strength shrink-swell	Moderate: flooding
MllA:						
Miller	Moderate: flooding too clayey	Severe: flooding shrink-swell	Severe: flooding shrink-swell	Severe: flooding shrink-swell	Severe: flooding low strength shrink-swell	Severe: too clayey
M-W:						
Miscellaneous water						
NewB:						
Newalla	Moderate: too clayey dense layer	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Slight
NewC2:						
Newalla	Moderate: too clayey dense layer	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Slight
NorB:						
Norge	Moderate: too clayey	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell	Severe: low strength	Slight

Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
NorC:						
Norge	Moderate: too clayey	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell slope	Severe: low strength	Slight
NorC2:						
Norge	Moderate: too clayey	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell slope	Severe: low strength	Slight
NoUC:						
Norge	Moderate: too clayey	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell slope	Severe: low strength	Slight
Urban land.						
PdHC:						
Piedmont	Moderate: too clayey dense layer depth to rock	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: depth to rock
Huska	Moderate: too clayey dense layer	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: excess sodium
PieC2:						
Piedmont	Moderate: too clayey dense layer depth to rock	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: depth to rock
PimB:						
Piedmont	Moderate: too clayey dense layer depth to rock	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: depth to rock
PimC:						
Piedmont	Moderate: too clayey dense layer depth to rock	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: depth to rock
PIT:						
Pits.						
PukA:						
Pulaski	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding
PulA:						
Pulaski	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding
RenB:						
Renfrow	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Slight

Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
RinB:						
Renthin----------------	Moderate: too clayey dense layer	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Slight
RnnB:						
Renthin----------------	Moderate: too clayey dense layer	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Slight
RnnC2:						
Renthin----------------	Moderate: too clayey dense layer	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Slight
RnUC:						
Renthin----------------	Moderate: too clayey dense layer	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Slight
Urban land.						
SDGD4:						
Stephenville-----------	Moderate: dense layer depth to rock	Slight	Moderate: depth to rock	Moderate: slope	Slight	Moderate: large stones depth to rock
Darsil-----------------	Severe: depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: slope depth to rock	Moderate: depth to rock	Severe: depth to rock droughty
Gullied land.						
SDND:						
Stephenville-----------	Moderate: dense layer depth to rock	Slight	Moderate: depth to rock	Moderate: slope	Slight	Moderate: large stones depth to rock
Darsil-----------------	Severe: depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: slope depth to rock	Moderate: depth to rock	Severe: depth to rock droughty
Newalla----------------	Moderate: too clayey dense layer	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Slight
SDND2:						
Stephenville-----------	Moderate: dense layer depth to rock	Slight	Moderate: depth to rock	Moderate: slope	Slight	Moderate: large stones depth to rock
Darsil-----------------	Severe: depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: slope depth to rock	Moderate: depth to rock	Severe: depth to rock droughty
Newalla----------------	Moderate: too clayey dense layer	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Slight

Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
StDC:						
Stephenville	Moderate: dense layer depth to rock	Slight	Moderate: depth to rock	Moderate: slope	Slight	Moderate: large stones depth to rock
Darsil	Severe: depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: depth to rock	Moderate: depth to rock	Severe: depth to rock droughty
StDC2:						
Stephenville	Moderate: dense layer depth to rock	Slight	Moderate: depth to rock	Moderate: slope	Slight	Moderate: large stones depth to rock
Darsil	Severe: depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: depth to rock	Moderate: depth to rock	Severe: depth to rock droughty
StLC4:						
Stephenville	Moderate: dense layer depth to rock	Slight	Moderate: depth to rock	Moderate: slope	Slight	Moderate: large stones depth to rock
Littleaxe	Moderate: dense layer	Slight	Slight	Moderate: slope	Slight	Slight
SUND:						
Stephenville	Moderate: dense layer depth to rock	Slight	Moderate: depth to rock	Moderate: slope	Slight	Moderate: large stones depth to rock
Urban land.						
Newalla	Moderate: too clayey dense layer	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Slight
TevD:						
Teval	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Moderate: low strength	Slight
TevD2:						
Teval	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Moderate: low strength	Slight
TlrB:						
Teller	Slight	Slight	Slight	Slight	Moderate: low strength	Slight
TlrC:						
Teller	Slight	Slight	Slight	Moderate: slope	Moderate: low strength	Slight
TlrC2:						
Teller	Slight	Slight	Slight	Moderate: slope	Moderate: low strength	Slight
TlrD:						
Teller	Slight	Slight	Slight	Moderate: slope	Moderate: low strength	Slight

Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
TlUD:						
Teller	Slight	Slight	Slight	Moderate: slope	Moderate: low strength	Slight
Urban land.						
TriA:						
Tribbey	Severe: wetness cutbanks cave	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness
URB:						
Urban land.						
VanA:						
Vanoss	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell	Severe: low strength	Slight
VanB:						
Vanoss	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell	Severe: low strength	Slight
W:						
Water.						
WauA:						
Waurika	Severe: wetness	Severe: shrink-swell wetness	Severe: shrink-swell wetness	Severe: shrink-swell wetness	Severe: low strength shrink-swell	Moderate: wetness
WtgA:						
Watonga	Severe: cutbanks cave	Severe: flooding shrink-swell	Severe: flooding shrink-swell	Severe: flooding shrink-swell	Severe: low strength shrink-swell	Severe: too clayey
WuUA:						
Watonga	Severe: cutbanks cave	Severe: flooding shrink-swell	Severe: flooding shrink-swell	Severe: flooding shrink-swell	Severe: low strength shrink-swell	Severe: too clayey
Urban land.						
YaGA:						
Yahola	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding
Gaddy	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding droughty
YahA:						
Yahola	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding
YaUA:						
Yahola	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding	Slight
Urban land.						

Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
ZanB:						
Zaneis	Moderate: dense layer	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: low strength shrink-swell	Slight
ZanC:						
Zaneis	Moderate: dense layer	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell slope	Moderate: low strength shrink-swell	Slight
ZanC2:						
Zaneis	Moderate: dense layer	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell slope	Moderate: low strength shrink-swell	Slight
ZaUC:						
Zaneis	Moderate: dense layer	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell slope	Moderate: low strength shrink-swell	Slight
Urban land.						

Construction Materials

The table "Construction Materials" gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In the table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 6 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* have one or more of the following: more than 35 percent silt- and clay-sized particles, a plasticity index of less than 10, a moderate shrink-swell potential, slopes of 15 to 25 percent, many stones, or a water table at a depth of 1 to 3 feet. Soils rated *poor* have one or more of the following: a plasticity index of more than 10, a high shrink-swell potential, many stones, slopes of more than 25 percent, or a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table, only the probability of finding material in suitable quantity in or below the soil is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils; loamy soils that have a relatively high content of clay; soils that have only 20 to 40 inches of suitable material; soils that have an appreciable amount of gravel, stones, or soluble salts; or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey; have less than 20 inches of suitable material; have a large amount of gravel, stones, or soluble salts; have slopes of more than 15 percent; or have a seasonal high water table at or near the surface.

The surface layer of most soils generally is preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
AhpA:				
Ashport	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
AmbE:				
Amber	Good	Improbable: excess fines	Improbable: excess fines	Fair: slope
AshA:				
Asher	Good	Improbable: excess fines	Improbable: excess fines	Fair: too clayey too sandy
AspA:				
Ashport	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
AstA:				
Ashport	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
BetA:				
Bethany	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
BetB:				
Bethany	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
BeUB:				
Bethany	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
Urban land.				
CaaA:				
Canadian	Good	Improbable: excess fines	Improbable: excess fines	Good
CaUB:				
Canadian	Good	Improbable: excess fines	Improbable: excess fines	Good
Urban land.				
CoIC2:				
Coyle	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones
Ironmound	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim depth to rock

Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
CoUB:				
Coyle-------------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones
Urban land.				
CoyB:				
Coyle-------------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones
DalA:				
Dale--------------------	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Good
DAM:				
Dams.				
DaUA:				
Dale--------------------	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Good
Urban land.				
DeDE:				
Derby-------------------	Good	Probable	Improbable: too sandy	Poor: too sandy
Dougherty---------------	Good	Improbable: thin layer	Improbable: too sandy	Poor: too sandy
DerB:				
Derby-------------------	Good	Probable	Improbable: too sandy	Poor: too sandy
DerE:				
Derby-------------------	Good	Probable	Improbable: too sandy	Poor: too sandy
DleA:				
Dale--------------------	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
DSRG:				
Darsil------------------	Poor: slope depth to rock	Improbable: thin layer	Improbable: too sandy	Poor: area reclaim too sandy depth to rock
Stephenville------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope
Rock outcrop.				
DUDE:				
Derby-------------------	Good	Probable	Improbable: too sandy	Poor: too sandy
Urban land.				
Dougherty---------------	Good	Improbable: thin layer	Improbable: too sandy	Poor: too sandy

Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
EasA:				
Easpur	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
GaGA:				
Gaddy	Good	Probable	Improbable: too sandy	Poor: too sandy
Gracemore	Poor: wetness	Probable	Improbable: too sandy	Poor: too sandy wetness
GcmA:				
Gracemont	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: excess salt wetness
GmtA:				
Gracemont	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
GraC:				
Grainola	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
GrAD:				
Grainola	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
Ashport	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
GrHC:				
Grant	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
Huska	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: excess sodium excess salt too clayey
GrIE:				
Grainola	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
Ironmound	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim depth to rock
GrPB2:				
Grainola	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: too clayey

Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
GrPB2:				
Piedmont	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
GrPC2:				
Grainola	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
Piedmont	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
GUIE:				
Grainola	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
Urban land.				
Ironmound	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim depth to rock
HarC:				
Harrah	Good	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
HarC2:				
Harrah	Good	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
HarC4:				
Harrah	Good	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
HarG:				
Harrah	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
HaUC:				
Harrah	Good	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
Urban land.				
HiLA:				
Hibsaw	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: excess sodium excess salt wetness
Lomill	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey

Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
IrCE:				
Ironmound	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim depth to rock
Coyle	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones
IrKD:				
Ironmound	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim depth to rock
Kingfisher	Poor: low strength depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim thin layer depth to rock
KekA:				
Keokuk	Good	Improbable: excess fines	Improbable: excess fines	Fair: too sandy
KeoA:				
Keokuk	Good	Improbable: excess fines	Improbable: excess fines	Fair: too sandy
KeUA:				
Keokuk	Good	Improbable: excess fines	Improbable: excess fines	Fair: too sandy
Urban land.				
KgIC:				
Kingfisher	Poor: low strength depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim thin layer depth to rock
Ironmound	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim depth to rock
KowB:				
Konawa	Good	Improbable: excess fines	Improbable: excess fines	Poor: thin layer
KowD:				
Konawa	Good	Improbable: excess fines	Improbable: excess fines	Poor: thin layer
KowD2:				
Konawa	Good	Improbable: excess fines	Improbable: excess fines	Poor: thin layer
KowD4:				
Konawa	Good	Improbable: excess fines	Improbable: excess fines	Poor: thin layer
KrdA:				
Kirkland	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey

Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
KrUA:				
Kirkland----------------	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
Urban land.				
KUIC:				
Kingfisher--------------	Poor: low strength depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim thin layer depth to rock
Urban land.				
Ironmound---------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim depth to rock
KwUD:				
Konawa------------------	Good	Improbable: excess fines	Improbable: excess fines	Poor: thin layer
Urban land.				
LarA:				
Lawrie------------------	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
LatG:				
Latrass-----------------	Poor: low strength shrink-swell slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope too clayey
LawA:				
Lawrie------------------	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
LitB:				
Littleaxe---------------	Fair: thin layer depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim too clayey
LitC:				
Littleaxe---------------	Fair: thin layer depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim too clayey
LitC2:				
Littleaxe---------------	Fair: thin layer depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim too clayey
LomA:				
Lomill------------------	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
LtUC:				
Littleaxe---------------	Fair: thin layer depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim too clayey

Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
LtUC:				
Urban land.				
LweA:				
Lawrie	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
LwfA:				
Lawrie	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
LwUA:				
Lawrie	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
Urban land.				
MlfA:				
Miller	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: thin layer
MllA:				
Miller	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
M-W:				
Miscellaneous water.				
NewB:				
Newalla	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
NewC2:				
Newalla	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
NorB:				
Norge	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
NorC:				
Norge	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
NorC2:				
Norge	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
NoUC:				
Norge	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
Urban land.				
PdHC:				
Piedmont	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: too clayey

Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
PdHC:				
Huska-------------------	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: excess sodium excess salt too clayey
PieC2:				
Piedmont----------------	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
PimB:				
Piedmont----------------	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
PimC:				
Piedmont----------------	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
PIT:				
Pits.				
PukA:				
Pulaski-----------------	Good	Improbable: excess fines	Improbable: excess fines	Good
PulA:				
Pulaski-----------------	Good	Improbable: excess fines	Improbable: excess fines	Good
RenB:				
Renfrow-----------------	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
RinB:				
Renthin-----------------	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
RnnB:				
Renthin-----------------	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
RnnC2:				
Renthin-----------------	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
RnUC:				
Renthin-----------------	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
Urban land.				

Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
SDGD4:				
Stephenville------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim depth to rock
Darsil------------------	Poor: depth to rock	Improbable: thin layer	Improbable: too sandy	Poor: area reclaim too sandy depth to rock
Gullied land.				
SDND:				
Stephenville------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim depth to rock
Darsil------------------	Poor: depth to rock	Improbable: thin layer	Improbable: too sandy	Poor: area reclaim too sandy depth to rock
Newalla-----------------	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
SDND2:				
Stephenville------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim depth to rock
Darsil------------------	Poor: depth to rock	Improbable: thin layer	Improbable: too sandy	Poor: area reclaim too sandy depth to rock
Newalla-----------------	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
StDC:				
Stephenville------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim depth to rock
Darsil------------------	Poor: depth to rock	Improbable: thin layer	Improbable: too sandy	Poor: area reclaim too sandy depth to rock
StDC2:				
Stephenville------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim depth to rock
Darsil------------------	Poor: depth to rock	Improbable: thin layer	Improbable: too sandy	Poor: area reclaim too sandy depth to rock

Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
StLC4:				
Stephenville------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim depth to rock
Littleaxe---------------	Fair: thin layer depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim too clayey
SUND:				
Stephenville------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim depth to rock
Urban land.				
Newalla-----------------	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
TevD:				
Teval-------------------	Good	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim small stones too clayey
TevD2:				
Teval-------------------	Good	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim small stones too clayey
TlrB:				
Teller------------------	Good	Improbable: excess fines	Improbable: excess fines	Good
TlrC:				
Teller------------------	Good	Improbable: excess fines	Improbable: excess fines	Good
TlrC2:				
Teller------------------	Good	Improbable: excess fines	Improbable: excess fines	Good
TlrD:				
Teller------------------	Good	Improbable: excess fines	Improbable: excess fines	Good
TlUD:				
Teller------------------	Good	Improbable: excess fines	Improbable: excess fines	Good
Urban land.				
TriA:				
Tribbey-----------------	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
URB:				
Urban land.				

Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
VanA:				
Vanoss	Fair: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
VanB:				
Vanoss	Fair: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
W:				
Water.				
WauA:				
Waurika	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
WtgA:				
Watonga	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
WuUA:				
Watonga	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
Urban land.				
YaGA:				
Yahola	Good	Improbable: excess fines	Improbable: excess fines	Good
Gaddy	Good	Probable	Improbable: too sandy	Poor: too sandy
YahA:				
Yahola	Good	Improbable: excess fines	Improbable: excess fines	Good
YaUA:				
Yahola	Good	Improbable: excess fines	Improbable: excess fines	Good
Urban land.				
ZanB:				
Zaneis	Fair: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim too clayey
ZanC:				
Zaneis	Fair: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim too clayey
ZanC2:				
Zaneis	Fair: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim too clayey

Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
ZaUC:				
Zaneis------------------	Fair: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim too clayey
Urban land.				

Water Management

The table "Water Management" gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In the table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even more than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
AhpA:							
Ashport-------	Moderate: seepage	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: flooding	Limitation: erodes easily	Limitation: erodes easily
AmbE:							
Amber---------	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope soil blowing	Limitation: erodes easily slope soil blowing	Limitation: erodes easily slope
AshA:							
Asher---------	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly	Limitation: erodes easily	Limitation: erodes easily percs slowly
AspA:							
Ashport-------	Moderate: seepage	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily flooding	Limitation: erodes easily	Limitation: erodes easily
AstA:							
Ashport-------	Moderate: seepage	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily flooding	Limitation: erodes easily	Limitation: erodes easily
BetA:							
Bethany-------	Slight	Moderate: hard to pack	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly
BetB:							
Bethany-------	Slight	Moderate: hard to pack	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly
BeUB:							
Bethany-------	Slight	Moderate: hard to pack	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly
Urban land.							
CaaA:							
Canadian------	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: soil blowing	Limitation: soil blowing	Favorable
CaUB:							
Canadian------	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: soil blowing	Limitation: soil blowing	Favorable
Urban land.							
CoIC2:							
Coyle---------	Moderate: seepage slope depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: erodes easily depth to rock	Limitation: erodes easily depth to rock

Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
CoIC2:							
Ironmound-----	Severe: depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing depth to rock	Limitation: soil blowing depth to rock	Limitation: rooting depth depth to rock
CoUB:							
Coyle---------	Moderate: seepage depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: depth to rock	Limitation: erodes easily depth to rock	Limitation: erodes easily depth to rock
Urban land.							
CoyB:							
Coyle---------	Moderate: seepage depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: depth to rock	Limitation: erodes easily depth to rock	Limitation: erodes easily depth to rock
DalA:							
Dale----------	Moderate: seepage	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily	Limitation: erodes easily	Limitation: erodes easily
DAM:							
Dams.							
DaUA:							
Dale----------	Moderate: seepage	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily	Limitation: erodes easily	Limitation: erodes easily
Urban land.							
DeDE:							
Derby---------	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Dougherty-----	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: rooting depth slope droughty
DerB:							
Derby---------	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake droughty	Limitation: too sandy soil blowing	Limitation: droughty
DerE:							
Derby---------	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
DleA:							
Dale----------	Moderate: seepage	Moderate: piping	Severe: no water	Limitation: deep to water	Favorable	Limitation: erodes easily	Limitation: erodes easily
DSRG:							
Darsil--------	Severe: slope depth to rock	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy depth to rock	Limitation: slope depth to rock droughty

Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
DSRG:							
Stephenville--	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: slope soil blowing depth to rock	Limitation: rooting depth slope depth to rock
Rock outcrop.							
DUDE:							
Derby---------	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Urban land.							
Dougherty-----	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: rooting depth slope droughty
EasA:							
Easpur--------	Moderate: seepage	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily flooding	Limitation: erodes easily	Limitation: erodes easily
GaGA:							
Gaddy---------	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake flooding droughty	Limitation: too sandy soil blowing	Limitation: droughty
Gracemore-----	Severe: seepage	Severe: seepage piping wetness	Severe: cutbanks cave	Limitation: flooding cutbanks cave	Limitation: fast intake wetness droughty	Limitation: too sandy wetness soil blowing	Limitation: wetness droughty
GcmA:							
Gracemont-----	Severe: seepage	Severe: seepage piping wetness	Severe: cutbanks cave	Limitation: flooding percs slowly cutbanks cave	Limitation: slow intake wetness droughty	Limitation: erodes easily too sandy wetness	Limitation: erodes easily excess salt wetness
GmtA:							
Gracemont-----	Severe: seepage	Severe: piping wetness	Moderate: slow refill	Limitation: flooding	Limitation: wetness	Limitation: wetness soil blowing	Limitation: wetness
GraC:							
Grainola------	Moderate: slope depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope depth to rock	Limitation: erodes easily depth to rock	Limitation: erodes easily depth to rock
GrAD:							
Grainola------	Moderate: slope depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope depth to rock	Limitation: erodes easily depth to rock	Limitation: erodes easily depth to rock
Ashport-------	Moderate: seepage	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: flooding	Limitation: erodes easily	Limitation: erodes easily

Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
GrHC:							
Grant---------	Moderate: seepage slope depth to rock	Moderate: piping thin layer	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope	Limitation: erodes easily	Limitation: erodes easily
Huska---------	Moderate: slope depth to rock	Severe: excess sodium	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily percs slowly	Limitation: erodes easily excess sodium excess salt
GrIE:							
Grainola------	Severe: slope	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope depth to rock	Limitation: erodes easily slope depth to rock	Limitation: erodes easily slope depth to rock
Ironmound-----	Severe: slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing depth to rock	Limitation: slope soil blowing depth to rock	Limitation: rooting depth slope depth to rock
GrPB2:							
Grainola------	Moderate: depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly depth to rock	Limitation: erodes easily depth to rock	Limitation: erodes easily depth to rock
Piedmont------	Moderate: depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly depth to rock	Limitation: erodes easily percs slowly depth to rock	Limitation: erodes easily rooting depth depth to rock
GrPC2:							
Grainola------	Moderate: slope depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope depth to rock	Limitation: erodes easily depth to rock	Limitation: erodes easily depth to rock
Piedmont------	Moderate: slope depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope depth to rock	Limitation: erodes easily percs slowly depth to rock	Limitation: erodes easily rooting depth depth to rock
GUIE:							
Grainola------	Severe: slope	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope depth to rock	Limitation: erodes easily slope depth to rock	Limitation: erodes easily slope depth to rock
Urban land.							
Ironmound-----	Severe: slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: rooting depth slope depth to rock
HarC:							
Harrah--------	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: soil blowing	Favorable

Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
HarC2:							
Harrah--------	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: soil blowing	Favorable
HarC4:							
Harrah--------	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: soil blowing	Favorable
HarG:							
Harrah--------	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: slope soil blowing	Limitation: slope
HaUC:							
Harrah--------	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: soil blowing	Favorable
Urban land.							
HiLA:							
Hibsaw--------	Severe: seepage	Severe: seepage piping ponding	Severe: slow refill cutbanks cave	Limitation: flooding percs slowly ponding	Limitation: percs slowly ponding droughty	Limitation: erodes easily percs slowly ponding	Limitation: excess sodium excess salt wetness
Lomill--------	Severe: seepage	Severe: seepage piping	Severe: slow refill cutbanks cave	Limitation: flooding percs slowly cutbanks cave	Limitation: percs slowly wetness	Limitation: erodes easily wetness	Limitation: erodes easily percs slowly
IrCE:							
Ironmound-----	Severe: slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing depth to rock	Limitation: slope soil blowing depth to rock	Limitation: rooting depth slope depth to rock
Coyle---------	Severe: slope	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: erodes easily slope depth to rock	Limitation: erodes easily slope depth to rock
IrKD:							
Ironmound-----	Severe: depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: depth to rock	Limitation: rooting depth depth to rock
Kingfisher----	Moderate: slope depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: rooting depth slope depth to rock	Limitation: erodes easily depth to rock	Limitation: erodes easily depth to rock
KekA:							
Keokuk--------	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily	Limitation: erodes easily	Limitation: erodes easily
KeoA:							
Keokuk--------	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily flooding	Limitation: erodes easily	Limitation: erodes easily

Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
KeUA:							
Keokuk--------	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily	Limitation: erodes easily	Limitation: erodes easily
Urban land.							
KgIC:							
Kingfisher----	Moderate: slope depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: rooting depth slope depth to rock	Limitation: erodes easily depth to rock	Limitation: erodes easily depth to rock
Ironmound-----	Severe: depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: depth to rock	Limitation: rooting depth depth to rock
KowB:							
Konawa--------	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: soil blowing	Limitation: soil blowing	Limitation: rooting depth
KowD:							
Konawa--------	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing	Limitation: rooting depth
KowD2:							
Konawa--------	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing	Limitation: rooting depth
KowD4:							
Konawa--------	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing	Limitation: rooting depth
KrdA:							
Kirkland------	Slight	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly
KrUA:							
Kirkland------	Slight	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly
Urban land.							
KUIC:							
Kingfisher----	Moderate: slope depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: rooting depth slope depth to rock	Limitation: erodes easily depth to rock	Limitation: erodes easily depth to rock
Urban land.							
Ironmound-----	Severe: depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: depth to rock	Limitation: rooting depth depth to rock

Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
KwUD:							
Konawa--------	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing	Limitation: rooting depth
Urban land.							
LarA:							
Lawrie--------	Moderate: seepage	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily flooding	Limitation: erodes easily	Limitation: erodes easily
LatG:							
Latrass-------	Severe: slope	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope droughty	Limitation: erodes easily percs slowly slope	Limitation: erodes easily slope droughty
LawA:							
Lawrie--------	Moderate: seepage	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily	Limitation: erodes easily	Limitation: erodes easily
LitB:							
Littleaxe-----	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: soil blowing	Limitation: soil blowing	Favorable
LitC:							
Littleaxe-----	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing	Favorable
LitC2:							
Littleaxe-----	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing	Favorable
LomA:							
Lomill--------	Severe: seepage	Severe: seepage piping	Severe: slow refill cutbanks cave	Limitation: flooding percs slowly cutbanks cave	Limitation: percs slowly wetness	Limitation: erodes easily wetness	Limitation: erodes easily percs slowly
LtUC:							
Littleaxe-----	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing	Favorable
Urban land.							
LweA:							
Lawrie--------	Moderate: seepage	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: flooding	Limitation: erodes easily	Limitation: erodes easily
LwfA:							
Lawrie--------	Moderate: seepage	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: flooding soil blowing	Limitation: erodes easily soil blowing	Limitation: erodes easily
LwUA:							
Lawrie--------	Moderate: seepage	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily	Limitation: erodes easily	Limitation: erodes easily

Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
LwUA: Urban land.							
MlfA: Miller	Slight	Moderate: hard to pack	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly soil blowing	Limitation: erodes easily percs slowly soil blowing	Limitation: erodes easily percs slowly
MllA: Miller	Slight	Moderate: hard to pack	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly slow intake	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly
M-W: Miscellaneous water.							
NewB: Newalla	Moderate: depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly soil blowing	Limitation: erodes easily soil blowing	Limitation: erodes easily percs slowly
NewC2: Newalla	Moderate: slope depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope soil blowing	Limitation: erodes easily soil blowing	Limitation: erodes easily percs slowly
NorB: Norge	Slight	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily	Limitation: erodes easily	Limitation: erodes easily
NorC: Norge	Moderate: slope	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope	Limitation: erodes easily	Limitation: erodes easily
NorC2: Norge	Moderate: slope	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope	Limitation: erodes easily	Limitation: erodes easily
NoUC: Norge	Moderate: slope	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope	Limitation: erodes easily	Limitation: erodes easily
Urban land.							
PdHC: Piedmont	Moderate: depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly depth to rock	Limitation: erodes easily percs slowly depth to rock	Limitation: erodes easily rooting depth depth to rock
Huska	Moderate: slope depth to rock	Severe: excess sodium	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily percs slowly	Limitation: erodes easily excess sodium excess salt

Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
PieC2:							
Piedmont------	Moderate: slope depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope depth to rock	Limitation: erodes easily percs slowly depth to rock	Limitation: erodes easily rooting depth depth to rock
PimB:							
Piedmont------	Moderate: depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly depth to rock	Limitation: erodes easily percs slowly depth to rock	Limitation: erodes easily rooting depth depth to rock
PimC:							
Piedmont------	Moderate: slope depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope depth to rock	Limitation: erodes easily percs slowly depth to rock	Limitation: erodes easily rooting depth depth to rock
PIT:							
Pits.							
PukA:							
Pulaski-------	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: flooding	Limitation: soil blowing	Favorable
PulA:							
Pulaski-------	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: flooding	Limitation: soil blowing	Favorable
RenB:							
Renfrow-------	Slight	Moderate: hard to pack	Severe: no water	Limitation: deep to water	Limitation: percs slowly rooting depth	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly rooting depth
RinB:							
Renthin-------	Moderate: depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly
RnnB:							
Renthin-------	Moderate: depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly
RnnC2:							
Renthin-------	Moderate: slope depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly slope	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly
RnUC:							
Renthin-------	Moderate: slope depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly slope	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly
Urban land.							

Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
SDGD4:							
Stephenville--	Moderate: seepage slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing depth to rock	Limitation: rooting depth depth to rock
Darsil--------	Severe: depth to rock	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy depth to rock	Limitation: depth to rock droughty
Gullied land.							
SDND:							
Stephenville--	Moderate: seepage slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing depth to rock	Limitation: rooting depth depth to rock
Darsil--------	Severe: depth to rock	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy depth to rock	Limitation: depth to rock droughty
Newalla-------	Moderate: slope depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope soil blowing	Limitation: erodes easily soil blowing	Limitation: erodes easily percs slowly
SDND2:							
Stephenville--	Moderate: seepage slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing depth to rock	Limitation: rooting depth depth to rock
Darsil--------	Severe: depth to rock	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy depth to rock	Limitation: depth to rock droughty
Newalla-------	Moderate: slope depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope soil blowing	Limitation: erodes easily soil blowing	Limitation: erodes easily percs slowly
StDC:							
Stephenville--	Moderate: seepage slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing depth to rock	Limitation: rooting depth depth to rock
Darsil--------	Severe: depth to rock	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy depth to rock	Limitation: depth to rock droughty
StDC2:							
Stephenville--	Moderate: seepage slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing depth to rock	Limitation: rooting depth depth to rock

Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
StDC2:							
Darsil	Severe: depth to rock	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy depth to rock	Limitation: depth to rock droughty
StLC4:							
Stephenville	Moderate: seepage slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing depth to rock	Limitation: rooting depth depth to rock
Littleaxe	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing	Favorable
SUND:							
Stephenville	Moderate: seepage slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing depth to rock	Limitation: rooting depth depth to rock
Urban land.							
Newalla	Moderate: slope depth to rock	Moderate: hard to pack thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope	Limitation: erodes easily	Limitation: erodes easily percs slowly
TevD:							
Teval	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope	Limitation: erodes easily	Limitation: erodes easily
TevD2:							
Teval	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope	Limitation: erodes easily	Limitation: erodes easily
TlrB:							
Teller	Severe: seepage	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: soil blowing	Favorable	Favorable
TlrC:							
Teller	Severe: seepage	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Favorable	Favorable
TlrC2:							
Teller	Severe: seepage	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Favorable	Favorable
TlrD:							
Teller	Severe: seepage	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Favorable	Favorable
TlUD:							
Teller	Severe: seepage	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Favorable	Favorable

Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
TlUD: Urban land.							
TriA: Tribbey	Severe: seepage	Severe: seepage piping wetness	Severe: cutbanks cave	Limitation: flooding cutbanks cave	Limitation: wetness droughty	Limitation: wetness soil blowing	Limitation: rooting depth wetness droughty
URB: Urban land.							
VanA: Vanoss	Moderate: seepage	Moderate: piping thin layer	Severe: no water	Limitation: deep to water	Limitation: erodes easily	Limitation: erodes easily	Limitation: erodes easily
VanB: Vanoss	Moderate: seepage	Moderate: piping thin layer	Severe: no water	Limitation: deep to water	Limitation: erodes easily	Limitation: erodes easily	Limitation: erodes easily
W: Water.							
WauA: Waurika	Slight	Moderate: hard to pack wetness	Severe: no water	Limitation: percs slowly	Limitation: erodes easily percs slowly wetness	Limitation: erodes easily percs slowly wetness	Limitation: erodes easily percs slowly wetness
WtgA: Watonga	Slight	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly slow intake	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly
WuUA: Watonga	Slight	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly slow intake	Limitation: erodes easily percs slowly	Limitation: erodes easily percs slowly
Urban land.							
YaGA: Yahola	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: flooding	Limitation: soil blowing	Favorable
Gaddy	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: flooding droughty	Limitation: too sandy soil blowing	Limitation: droughty
YahA: Yahola	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: flooding	Limitation: soil blowing	Favorable
YaUA: Yahola	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Favorable	Favorable
Urban land.							

Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
ZanB:							
Zaneis--------	Moderate: seepage depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Favorable	Limitation: erodes easily	Limitation: erodes easily
ZanC:							
Zaneis--------	Moderate: seepage slope depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: erodes easily	Limitation: erodes easily
ZanC2:							
Zaneis--------	Moderate: seepage slope depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: erodes easily	Limitation: erodes easily
ZaUC:							
Zaneis--------	Moderate: seepage slope depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: erodes easily	Limitation: erodes easily
Urban land.							

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

The table “Engineering Index Properties” gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the series descriptions in Part I of this survey.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000) and the Unified soil classification system (ASTM, 2001).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3

inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Engineering Index Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*	*Pct*					*Pct*	
AhpA:												
Ashport-----	0-5	Silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	90-98	33-42	12-19
	5-14	Silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	90-98	33-42	12-19
	14-36	Silty clay loam, loam, silt loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	75-98	30-43	8-20
	36-96	Silty clay loam, loam, silt loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	75-98	30-43	8-20
AmbE:												
Amber-------	0-9	Very fine sandy loam	CL-ML, ML	A-4	0	0	100	100	94-100	65-90	14-28	NP-7
	9-11	Very fine sandy loam	CL-ML, ML	A-4	0	0	100	100	94-100	65-90	14-28	NP-7
	11-22	Very fine sandy loam, loam, silt loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	65-97	14-31	NP-10
	22-38	Stratified very fine sandy loam to silt loam	SC, SM, SC-SM	A-4	0	0	100	100	94-100	65-97	14-30	NP-7
	38-84	Stratified very fine sandy loam to silty clay loam	SC-SM, SC, SM	A-6, A-4, A-7	0	0	100	100	94-100	36-98	14-42	NP-19
AshA:												
Asher-------	0-8	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	90-98	33-50	12-25
	8-14	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	90-98	33-50	12-25
	14-31	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	90-98	33-50	12-25
	31-88	Stratified loamy very fine sand to fine sandy loam to very fine sandy loam to loam to silt loam to silty clay loam	SC, SC-SM, SM	A-4	0	0	100	98-100	90-100	36-47	15-31	NP-10
AspA:												
Ashport-----	0-7	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	70-97	22-37	2-13
	7-15	Silt loam	CL-ML, CL, ML	A-4, A-6	0	0	100	100	96-100	70-97	22-37	2-13
	15-29	Silty clay loam, loam, silt loam	CL	A-4, A-7, A-6	0	0	100	100	96-100	75-98	30-43	8-20
	29-72	Stratified silt loam to very fine sandy loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	75-98	30-43	8-20
	72-83	Silt loam, very fine sandy loam, loam, silty clay loam	CL	A-4, A-7, A-6	0	0	100	100	96-100	75-98	30-43	8-20

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
AstA:												
Ashport-----	0-10	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	70-97	22-37	2-13
	10-24	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	75-98	30-43	8-20
	24-36	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	75-98	30-43	8-20
	36-48	Silty clay loam, loam, silt loam	CL	A-6, A-4, A-7	0	0	100	100	96-100	75-98	30-43	8-20
	48-64	Silty clay loam, loam, silt loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	75-98	30-43	8-20
BetA:												
Bethany-----	0-6	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	80-98	21-37	2-13
	6-14	Silt loam	CL-ML, CL, ML	A-4, A-6	0	0	100	100	96-100	80-98	21-37	2-13
	14-18	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-26
	18-36	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	96-100	96-100	90-99	37-60	15-34
	36-56	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	96-100	96-100	90-99	37-60	15-34
	56-80	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	96-100	96-100	90-99	37-60	15-34
BetB:												
Bethany-----	0-6	Silt loam	CL-ML, CL, ML	A-4, A-6	0	0	100	100	96-100	80-98	21-37	2-13
	6-13	Silt loam	CL, ML, CL-ML	A-4, A-6	0	0	100	100	96-100	80-98	21-37	2-13
	13-19	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-26
	19-32	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	96-100	96-100	90-99	37-60	15-34
	32-59	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	96-100	96-100	90-99	37-60	15-34
	59-84	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	96-100	96-100	90-99	37-60	15-34
BeUB:												
Bethany-----	0-12	Silt loam	CL, ML, CL-ML	A-4, A-6	0	0	100	100	96-100	80-98	21-37	2-13
	12-16	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-26
	16-28	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	96-100	96-100	90-99	37-60	15-34
	28-55	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	96-100	96-100	90-99	37-60	15-34
	55-84	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	96-100	96-100	90-99	37-60	15-34

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
BeUB:												
Urban land--	0-80	Variable	---	---	---	---	---	---	---	---	---	---
CaaA:												
Canadian----	0-8	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	100	94-100	36-60	14-26	NP-7
	8-19	Fine sandy loam, loam, sandy loam	CL-ML, ML, SM, SC-SM	A-4	0	0	100	100	94-100	36-85	14-29	NP-7
	19-30	Fine sandy loam, loam, sandy loam	ML, SC-SM, CL-ML, SM	A-4	0	0	100	100	94-100	36-85	14-29	NP-7
	30-80	Fine sandy loam, loam, loamy fine sand	ML, CL-ML, SC-SM, SM	A-2, A-3, A-4	0	0	100	100	82-100	5-85	0-29	NP-7
CaUB:												
Canadian----	0-8	Fine sandy loam	CL-ML, ML, SM, SC-SM	A-4	0	0	100	100	94-100	36-60	14-26	NP-7
	8-18	Fine sandy loam, loam, sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	100	94-100	36-85	14-29	NP-7
	18-28	Fine sandy loam, loam, sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	100	94-100	36-85	14-29	NP-7
	28-43	Fine sandy loam, loam, loamy fine sand	CL-ML, ML, SM, SC-SM	A-3, A-2, A-4	0	0	100	100	82-100	5-85	0-29	NP-7
	43-52	Fine sandy loam, loam, loamy fine sand	CL-ML, SM, ML, SC-SM	A-2, A-3, A-4	0	0	100	100	82-100	5-85	0-29	NP-7
	52-84	Loamy fine sand, loam, fine sandy loam	CL-ML, SM, ML, SC-SM	A-2, A-3, A-4	0	0	100	100	82-100	5-85	0-29	NP-7
Urban land--	0-60	Variable	---	---	---	---	---	---	---	---	---	---
CoIC2:												
Coyle-------	0-10	Loam	CL, CL-ML	A-4, A-6	0	0	100	100	96-100	65-85	25-35	4-13
	10-13	Loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0	0	100	98-100	94-100	36-85	22-35	4-13
	13-24	Clay loam, sandy clay loam	CL, SC	A-2, A-4, A-6	0	0	85-100	85-100	80-100	30-90	25-40	7-18
	24-31	Clay loam, sandy clay loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-2, A-4, A-6	0	0-45	55-100	55-100	50-100	20-90	22-40	4-18
	31-36	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
CoIC2:												
Ironmound---	0-7	Fine sandy loam	CL-ML, SM, ML, SC-SM	A-2, A-4	0	0	85-100	85-100	80-100	30-60	14-26	NP-7
	7-12	Loam, fine sandy loam, clay loam	CL-ML, CL, ML	A-4, A-6	0	0	85-100	80-100	76-100	52-85	14-35	2-18
	12-15	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
CoUB:												
Coyle-------	0-8	Loam	CL, CL-ML	A-4, A-6	0	0	100	100	96-100	65-85	25-35	4-13
	8-14	Loam, fine sandy loam	CL-ML, SC, CL, SC-SM	A-4, A-6	0	0	100	98-100	94-100	36-85	22-35	4-13
	14-22	Clay loam, sandy clay loam	CL, SC	A-2, A-4, A-6	0	0	85-100	85-100	80-100	30-90	25-40	7-18
	22-30	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Urban land--	0-60	Variable	---	---	---	---	---	---	---	---	---	---
CoyB:												
Coyle-------	0-7	Loam	CL, CL-ML	A-4, A-6	0	0	100	100	96-100	65-85	25-35	4-13
	7-10	Loam, fine sandy loam	CL, SC-SM, CL-ML, SC	A-4, A-6	0	0	100	98-100	94-100	36-85	22-35	4-13
	10-20	Clay loam, sandy clay loam	CL, SC	A-2, A-4, A-6	0	0	85-100	85-100	80-100	30-90	25-40	7-18
	20-27	Clay loam, sandy clay loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-2, A-6, A-4	0	0-45	55-100	55-100	50-100	20-90	22-40	4-18
	27-40	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
DalA:												
Dale--------	0-8	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	70-97	22-31	8-14
	8-14	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	70-97	22-31	8-14
	14-21	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-20
	21-27	Silt loam, loam, silty clay loam	CL	A-6, A-4, A-7	0	0	100	100	96-100	65-98	30-43	8-20
	27-53	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-20
	53-84	Stratified fine sandy loam to silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-20
DAM:												
Dams--------	0-80	Variable	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
DaUA:												
Dale--------	0-8	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	70-97	22-31	8-14
	8-22	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	70-97	22-31	8-14
	22-30	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-20
	30-38	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-20
	38-52	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-20
	52-84	Stratified very fine sandy loam to silt loam, loam, silty clay loam	CL	A-6, A-4, A-7	0	0	100	100	96-100	65-98	30-43	8-20
Urban land--	0-84	Variable	---	---	---	---	---	---	---	---	---	---
DeDE:												
Derby-------	0-15	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-0	NP
	15-27	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	5-35	0-0	NP
	27-45	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	5-35	0-0	NP
	45-61	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	5-35	0-0	NP
	61-72	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	5-35	0-0	NP
Dougherty---	0-6	Loamy fine sand	SM	A-2	0	0	100	100	90-100	15-35	0-14	NP
	6-24	Fine sand, loamy fine sand	SM, SP-SM	A-2, A-3	0	0	100	100	82-100	5-35	0-14	NP
	24-41	Fine sandy loam, sandy clay loam	ML, SC, CL, SM	A-4, A-6	0	0	100	100	90-100	36-65	20-37	3-16
	41-52	Fine sandy loam, sandy clay loam, loamy fine sand	ML, CL, SC, SM	A-2, A-4, A-6	0	0	100	100	90-100	15-65	15-37	NP-16
	52-66	Loamy fine sand, fine sandy loam	CL-ML, ML, SM, SC-SM	A-2, A-4	0	0	100	100	90-100	15-60	15-26	NP-7

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
DerB:												
Derby-------	0-16	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-0	NP
	16-28	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	5-35	0-0	NP
	28-56	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	5-35	0-0	NP
	56-100	Stratified fine sand to loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	5-35	0-0	NP
DerE:												
Derby-------	0-4	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-0	NP
	4-17	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	5-35	0-0	NP
	17-34	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	5-35	0-0	NP
	34-96	Stratified fine sand to loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	5-35	0-0	NP
DleA:												
Dale--------	0-9	Silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	90-98	33-42	12-19
	9-22	Silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	90-98	33-42	12-19
	22-31	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-20
	31-39	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-20
	39-66	Silt loam, loam, silty clay loam	CL	A-4, A-7, A-6	0	0	100	100	96-100	65-98	30-43	8-20
	66-96	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-20
DSRG:												
Darsil------	0-6	Loamy fine sand	SM	A-2	0	0	98-100	98-100	85-100	15-35	0-14	NP
	6-10	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	75-100	70-100	50-100	5-35	0-14	NP
	10-15	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
DSRG:												
Stephenville	0-4	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-2, A-4	0	0-15	83-100	83-100	80-100	11-60	14-26	NP-7
	4-5	Fine sandy loam, loamy fine sand	ML, CL-ML, SC-SM, SM	A-2, A-4	0	0-15	85-100	85-100	76-100	12-60	0-26	NP-7
	5-14	Sandy clay loam, fine sandy loam	CL, CL-ML, SC-SM, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	14-22	Fine sandy loam, sandy clay loam	CL, SC-SM, CL-ML, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	22-30	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
DUDE:												
Derby-------	0-6	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-0	NP
	6-23	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	5-35	0-0	NP
	23-32	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	5-35	0-0	NP
	32-84	Stratified fine sand to loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-100	5-35	0-0	NP
Urban land--	0-60	Variable	---	---	---	---	---	---	---	---	---	---
Dougherty---	0-5	Loamy fine sand	SM	A-2	0	0	100	100	90-100	15-35	0-14	NP
	5-26	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	100	82-100	5-35	0-14	NP
	26-45	Sandy clay loam, fine sandy loam	ML, CL, SC, SM	A-4, A-6	0	0	100	100	90-100	36-65	20-37	3-16
	45-63	Fine sandy loam, sandy clay loam, loamy fine sand	ML, CL, SC, SM	A-4, A-2, A-6	0	0	100	100	90-100	15-65	15-37	NP-16
	63-84	Loamy fine sand, fine sandy loam	ML, CL-ML, SC-SM, SM	A-2, A-4	0	0	100	100	90-100	15-60	15-26	NP-7

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
EasA:												
Easpur------	0-10	Loam	CL-ML, CL, ML	A-4, A-6	0	0	100	100	96-100	65-97	22-37	3-14
	10-24	Fine sandy loam, clay loam, loam, very fine sandy loam	ML, CL, SC, SM	A-4, A-6	0	0	100	98-100	94-100	36-90	20-40	3-18
	24-28	Clay loam, fine sandy loam, loam, very fine sandy loam	ML, CL, SC, SM	A-4, A-6	0	0	100	98-100	94-100	36-90	20-40	3-18
	28-60	Fine sandy loam, clay loam	CL, ML, SM, SC	A-4, A-6	0	0	100	98-100	94-100	36-90	20-40	3-18
	60-80	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-42	8-19
GaGA:												
Gaddy-------	0-7	Loamy fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	80-100	5-35	0-14	NP
	7-19	Stratified fine sand to clay loam	CL, ML, SP-SM, SM	A-3, A-2, A-4, A-6	0	0	100	98-100	80-100	5-90	0-40	NP-18
	19-79	Stratified fine sand to clay loam	ML, SM, CL, SP-SM	A-2, A-6, A-3, A-4	0	0	100	98-100	80-100	5-90	0-40	NP-18
Gracemore---	0-8	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-0	NP
	8-11	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	90-100	85-100	82-100	5-35	0-0	NP
	11-30	Loamy fine sand, sand, fine sand	SM, SP-SM	A-2, A-3	0	0	90-100	85-100	82-100	5-35	0-0	NP
	30-65	Stratified fine sand to loamy fine sand to fine sandy loam, sand, loamy fine sand	SM, SP-SM	A-2, A-3	0	0	90-100	85-100	82-100	5-35	0-0	NP
	65-80	Fine sand, sand, loamy fine sand	SM, SP-SM	A-2, A-3	0	0	90-100	85-100	82-100	5-35	0-0	NP
GcmA:												
Gracemont---	0-6	Silty clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-60	18-35
	6-9	Silty clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-60	18-35
	9-15	Fine sandy loam, loam, very fine sandy loam	CL-ML, SM, ML, SC-SM	A-4	0	0	100	98-100	94-100	36-85	22-29	NP-7
	15-26	Fine sandy loam, loam, very fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-85	22-29	NP-7
	26-79	Stratified loamy sand to silt loam	ML, SC-SM, CL-ML, SM	A-2, A-4, A-3	0	0	100	98-100	82-100	5-97	0-22	NP-7

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
GmtA:												
Gracemont---	0-9	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	15-26	NP-7
	9-12	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	15-26	NP-7
	12-21	Fine sandy loam, loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-90	22-29	2-7
	21-36	Fine sandy loam, loam	CL-ML, SM, ML, SC-SM	A-4	0	0	100	98-100	94-100	36-90	22-29	2-7
	36-79	Stratified loamy sand to silt loam	CL-ML, ML, SM, SC-SM	A-2, A-3, A-4	0	0	100	98-100	82-100	5-97	0-22	NP-7
GraC:												
Grainola----	0-8	Silty clay loam	CL	A-6, A-7	0-25	0-25	80-100	75-100	72-100	60-98	33-43	12-20
	8-18	Silty clay, clay loam, clay	CH, CL, SC	A-6, A-7	0-25	0-25	80-100	75-100	72-100	49-98	37-60	15-34
	18-30	Clay loam, clay, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	30-39	Clay loam, clay, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	39-45	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
GrAD:												
Grainola----	0-4	Silty clay loam	CL	A-6, A-7	0-25	0-25	80-100	75-100	72-100	60-98	33-43	12-20
	4-6	Silty clay, clay loam, clay	CL, CH, SC	A-6, A-7	0-25	0-25	80-100	75-100	72-100	49-98	37-60	15-34
	6-18	Clay loam, clay, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	18-34	Clay loam, clay, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	34-40	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Ashport-----	0-9	Silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	90-98	33-42	12-19
	9-14	Silty clay loam, loam, silt loam	CL	A-6, A-4, A-7	0	0	100	100	96-100	75-98	30-43	8-20
	14-32	Silty clay loam, loam, silt loam	CL	A-4, A-7, A-6	0	0	100	100	96-100	75-98	30-43	8-20
	32-55	Silty clay loam, loam, silt loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	75-98	30-43	8-20
	55-79	Stratified silty clay loam to silt loam, loam, silt loam	CL	A-4, A-7, A-6	0	0	100	100	96-100	75-98	30-43	8-20

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
GrHC:												
Grant-------	0-11	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	65-97	30-37	8-14
	11-17	Silt loam, loam, very fine sandy loam	CL, ML, CL-ML	A-4, A-6	0	0	100	100	90-100	51-90	20-32	1-10
	17-28	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	90-100	70-90	30-42	8-19
	28-38	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	90-100	70-90	30-42	8-19
	38-45	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	90-100	70-90	30-42	8-19
	45-52	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Huska-------	0-6	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	94-100	51-97	24-37	5-14
	6-12	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	12-29	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	29-42	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	42-44	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
GrIE:												
Grainola----	0-7	Silty clay loam	CL	A-6, A-7	0-25	0-25	80-100	75-100	72-100	60-98	33-43	12-20
	7-12	Silty clay, clay loam, clay	CH, CL, SC	A-6, A-7	0-25	0-25	80-100	75-100	72-100	49-98	37-60	15-34
	12-27	Clay loam, clay, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	27-38	Clay loam, clay, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	38-46	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Ironmound---	0-7	Fine sandy loam	ML, SC-SM, CL-ML, SM	A-2, A-4	0	0	85-100	85-100	80-100	30-60	14-26	NP-7
	7-18	Loam, fine sandy loam, clay loam	CL-ML, CL, ML	A-4, A-6	0	0	85-100	80-100	76-100	52-85	14-35	2-18
	18-22	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				*Pct*	*Pct*					*Pct*	
GrPB2:												
Grainola----	0-4	Silt loam	CL, SC	A-4, A-6	0-25	0-25	80-100	75-100	72-100	49-97	30-37	8-14
	4-19	Silty clay, clay loam, clay	CH, SC, CL	A-6, A-7	0-25	0-25	80-100	75-100	72-100	49-98	37-60	15-34
	19-32	Clay loam, clay, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	32-39	Clay loam, clay, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	39-45	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Piedmont----	0-7	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	80-97	30-37	8-13
	7-16	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	16-33	Silty clay, clay, gravelly silty clay	CL, CH, GC, SC	A-6, A-7	0	0	50-100	50-100	45-100	45-99	37-60	15-34
	33-39	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
GrPC2:												
Grainola----	0-4	Silty clay loam	CL	A-6, A-7	0-25	0-25	80-100	75-100	72-100	60-98	33-43	12-20
	4-12	Silty clay, clay loam, clay	CH, SC, CL	A-6, A-7	0-25	0-25	80-100	75-100	72-100	49-98	37-60	15-34
	12-24	Clay loam, clay, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	24-30	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Piedmont----	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-43	10-20
	7-15	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	15-23	Silty clay, clay, gravelly silty clay	CL, GC, CH, SC	A-6, A-7	0	0	50-100	50-100	45-100	45-99	37-60	15-34
	23-30	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
GUIE:												
Grainola----	0-4	Silty clay loam	CL	A-6, A-7	0-25	0-25	80-100	75-100	72-100	60-98	33-43	12-20
	4-16	Clay loam, clay, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	16-28	Clay loam, clay, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	28-36	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Urban land--	0-60	Variable	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*	*Pct*					*Pct*	
GUIE:												
Ironmound---	0-5	Loam	CL, CL-ML	A-4, A-6	0	0	85-100	85-100	76-100	52-97	24-35	4-13
	5-12	Loam, fine sandy loam, clay loam	CL, CL-ML, ML	A-4, A-6	0	0	85-100	80-100	76-100	52-85	14-35	2-18
	12-18	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
HarC:												
Harrah------	0-6	Fine sandy loam	CL-ML, SM, ML, SC-SM	A-4	0	0	95-100	95-100	94-100	36-60	15-26	NP-7
	6-13	Fine sandy loam, loamy fine sand	ML, SC-SM, CL-ML, SM	A-2, A-4	0	0	95-100	95-100	94-100	15-60	0-26	NP-7
	13-19	Fine sandy loam, loamy fine sand	ML, CL-ML, SC-SM, SM	A-2, A-4	0	0	95-100	95-100	94-100	15-60	0-26	NP-7
	19-33	Sandy clay loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0	0	95-100	95-100	90-100	36-65	20-37	5-16
	33-44	Sandy clay loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-4, A-2, A-6	0	0	70-100	70-100	60-100	25-65	20-37	5-16
	44-84	Sandy clay loam, fine sandy loam	CL, SC-SM, CL-ML, SC	A-2, A-6, A-4	0	0	70-100	70-100	60-100	25-65	20-37	5-16
HarC2:												
Harrah------	0-6	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	95-100	95-100	94-100	36-60	15-26	NP-7
	6-15	Sandy clay loam, fine sandy loam	CL, SC-SM, CL-ML, SC	A-4, A-6	0	0	95-100	95-100	90-100	36-65	20-37	5-16
	15-27	Sandy clay loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0	0	95-100	95-100	90-100	36-65	20-37	5-16
	27-37	Sandy clay loam, fine sandy loam	CL, CL-ML, SC-SM, SC	A-4, A-6	0	0	95-100	95-100	90-100	36-65	20-37	5-16
	37-47	Sandy clay loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0	0	95-100	95-100	90-100	36-65	20-37	5-16
	47-76	Sandy clay loam, fine sandy loam	CL, SC-SM, CL-ML, SC	A-4, A-2, A-6	0	0	70-100	70-100	60-100	25-65	20-37	5-16

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*	*Pct*					*Pct*	
HarC4:												
Harrah------	0-5	Fine sandy loam	ML, SC-SM, CL-ML, SM	A-4	0	0	95-100	95-100	94-100	36-60	15-26	NP-7
	5-8	Fine sandy loam, loamy fine sand	ML, CL-ML, SC-SM, SM	A-2, A-4	0	0	95-100	95-100	94-100	15-60	0-26	NP-7
	8-11	Sandy clay loam, fine sandy loam	CL, CL-ML, SC-SM, SC	A-4, A-6	0	0	95-100	95-100	90-100	36-65	20-37	5-16
	11-38	Sandy clay loam, fine sandy loam	CL, SC-SM, CL-ML, SC	A-4, A-6	0	0	95-100	95-100	90-100	36-65	20-37	5-16
	38-65	Sandy clay loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-2, A-6, A-4	0	0	70-100	70-100	60-100	25-65	20-37	5-16
	65-80	Sandy clay loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-2, A-6, A-4	0	0	70-100	70-100	60-100	25-65	20-37	5-16
HarG:												
Harrah------	0-8	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	95-100	95-100	94-100	36-60	15-26	NP-7
	8-13	Fine sandy loam, loamy fine sand	CL-ML, SM, ML, SC-SM	A-2, A-4	0	0	95-100	95-100	94-100	15-60	0-26	NP-7
	13-25	Sandy clay loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0	0	95-100	95-100	90-100	36-65	20-37	5-16
	25-35	Sandy clay loam, fine sandy loam	CL, SC-SM, CL-ML, SC	A-4, A-6	0	0	95-100	95-100	90-100	36-65	20-37	5-16
	35-43	Sandy clay loam, fine sandy loam	CL-ML, SC, CL, SC-SM	A-4, A-6	0	0	95-100	95-100	90-100	36-65	20-37	5-16
	43-84	Sandy clay loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-4, A-2, A-6	0	0	70-100	70-100	60-100	25-65	20-37	5-16
HaUC:												
Harrah------	0-6	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	95-100	95-100	94-100	36-60	15-26	NP-7
	6-8	Fine sandy loam, loamy fine sand	CL-ML, SM, ML, SC-SM	A-2, A-4	0	0	95-100	95-100	94-100	15-60	0-26	NP-7
	8-18	Sandy clay loam, fine sandy loam	CL, SC-SM, CL-ML, SC	A-4, A-6	0	0	95-100	95-100	90-100	36-65	20-37	5-16
	18-37	Sandy clay loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0	0	95-100	95-100	90-100	36-65	20-37	5-16
	37-52	Sandy clay loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0	0	95-100	95-100	90-100	36-65	20-37	5-16
	52-84	Sandy clay loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-2, A-4, A-6	0	0	70-100	70-100	60-100	25-65	20-37	5-16
Urban land--	0-60	Variable	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
HiLA:												
Hibsaw------	0-8	Loam	CL	A-6, A-4	0	0	100	100	96-100	65-85	30-37	9-14
	8-18	Loam, silt loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-42	8-19
	18-30	Silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	95-98	33-42	12-19
	30-74	Stratified loamy fine sand to silty clay	CL, ML, SM, SC-SM	A-2, A-4, A-6	0	0	100	100	90-100	15-99	15-40	NP-18
	74-96	Silty clay loam, silt loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	80-98	30-42	8-19
Lomill------	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	90-98	33-42	12-19
	7-25	Silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
	25-31	Silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
	31-84	Stratified loamy fine sand to silty clay	ML, CL, SC, SM	A-2, A-4, A-6	0	0	100	98-100	90-100	15-99	15-40	NP-18
IrCE:												
Ironmound---	0-8	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-2, A-4	0	0	85-100	85-100	80-100	30-60	14-26	NP-7
	8-14	Loam, fine sandy loam, clay loam	CL, CL-ML, ML	A-4, A-6	0	0	85-100	80-100	76-100	52-85	14-35	2-18
	14-20	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Coyle-------	0-9	Loam	CL, CL-ML	A-4, A-6	0	0	100	100	96-100	65-85	25-35	4-13
	9-12	Loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0	0	100	98-100	94-100	36-85	22-35	4-13
	12-23	Clay loam, sandy clay loam	CL, SC	A-2, A-6, A-4	0	0	85-100	85-100	80-100	30-90	25-40	7-18
	23-27	Clay loam, sandy clay loam, fine sandy loam	CL-ML, SC, CL, SC-SM	A-4, A-2, A-6	0	0-45	55-100	55-100	50-100	20-90	22-40	4-18
	27-30	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
IrKD:												
Ironmound---	0-3	Loam	CL, CL-ML	A-4, A-6	0	0	85-100	85-100	76-100	52-97	24-35	4-13
	3-13	Loam, fine sandy loam, clay loam	CL, ML, CL-ML	A-4, A-6	0	0	85-100	80-100	76-100	52-85	14-35	2-18
	13-21	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
IrKD:												
Kingfisher--	0-10	Silt loam	CL, ML, CL-ML	A-4, A-6	0	0	100	100	96-100	80-97	22-37	2-13
	10-21	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	21-38	Silty clay loam, clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	33-60	12-35
	38-49	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
KekA:												
Keokuk------	0-8	Very fine sandy loam	CL-ML, ML	A-4	0	0	100	100	94-100	65-90	14-28	NP-7
	8-12	Very fine sandy loam	CL-ML, ML	A-4	0	0	100	100	94-100	65-90	14-28	NP-7
	12-20	Silt loam, loam, very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	65-97	14-31	NP-10
	20-84	Stratified loamy very fine sand to silt loam	CL, SM, ML, SC	A-4	0	0	100	98-100	90-100	36-97	15-30	NP-10
KeoA:												
Keokuk------	0-11	Very fine sandy loam	CL-ML, ML	A-4	0	0	100	100	94-100	65-90	14-28	NP-7
	11-25	Silt loam, loam, very fine sandy loam	CL-ML, CL, ML	A-4	0	0	100	100	94-100	65-97	14-31	NP-10
	25-96	Stratified loamy very fine sand to silt loam	ML, CL, SC, SM	A-4	0	0	100	98-100	90-100	36-97	15-30	NP-10
KeUA:												
Keokuk------	0-16	Very fine sandy loam	CL-ML, ML	A-4	0	0	100	100	94-100	65-90	14-28	NP-7
	16-42	Silt loam, loam, very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	65-97	14-31	NP-10
	42-80	Stratified loamy very fine sand to silt loam	ML, CL, SC, SM	A-4	0	0	100	98-100	90-100	36-97	15-30	NP-10
Urban land--	0-60	Variable	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
KgIC:												
Kingfisher--	0-11	Silt loam	CL, ML, CL-ML	A-4, A-6	0	0	100	100	96-100	80-97	22-37	2-13
	11-13	Silt loam, silty clay loam, clay loam	CL	A-4, A-6	0	0	100	100	96-100	80-98	30-40	8-17
	13-25	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	25-28	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Ironmound---	0-6	Loam	CL, CL-ML	A-4, A-6	0	0	85-100	85-100	76-100	52-97	24-35	4-13
	6-14	Loam, fine sandy loam, clay loam	CL, CL-ML, ML	A-4, A-6	0	0	85-100	80-100	76-100	52-85	14-35	2-18
	14-18	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
KowB:												
Konawa------	0-5	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	5-17	Fine sandy loam, loamy fine sand, fine sand	ML, CL-ML, SC-SM, SM	A-2, A-4, A-3	0	0	100	98-100	82-100	5-60	0-26	NP-7
	17-34	Sandy clay loam, fine sandy loam	ML, SC, CL, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	34-58	Sandy clay loam, fine sandy loam	CL, SM, ML, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	58-84	Fine sandy loam, sandy clay loam, loamy fine sand	ML, CL-ML, SC-SM, SM	A-2, A-4, A-6	0	0	100	98-100	90-100	15-65	0-37	NP-16
KowD:												
Konawa------	0-8	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	8-11	Fine sandy loam, loamy fine sand, fine sand	CL-ML, SM, ML, SC-SM	A-3, A-2, A-4	0	0	100	98-100	82-100	5-60	0-26	NP-7
	11-28	Sandy clay loam, fine sandy loam	CL, ML, SM, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	28-38	Sandy clay loam, fine sandy loam	ML, CL, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	38-52	Sandy clay loam, fine sandy loam	ML, CL, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	52-80	Fine sandy loam, sandy clay loam, loamy fine sand	ML, CL-ML, SC-SM, SM	A-4, A-2, A-6	0	0	100	98-100	90-100	15-65	0-37	NP-16

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
KowD2:												
Konawa------	0-7	Fine sandy loam	CL-ML, SM, ML, SC-SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	7-18	Sandy clay loam, fine sandy loam	ML, CL, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	18-37	Sandy clay loam, fine sandy loam	ML, CL, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	37-80	Fine sandy loam, sandy clay loam, loamy fine sand	ML, CL-ML, SC-SM, SM	A-2, A-6, A-4	0	0	100	98-100	90-100	15-65	0-37	NP-16
KowD4:												
Konawa------	0-10	Fine sandy loam	CL-ML, SM, ML, SC-SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	10-13	Fine sandy loam, loamy fine sand, fine sand	ML, SC-SM, CL-ML, SM	A-3, A-2, A-4	0	0	100	98-100	82-100	5-60	0-26	NP-7
	13-35	Sandy clay loam, fine sandy loam	CL, ML, SM, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	35-53	Sandy clay loam, fine sandy loam	CL, SM, ML, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	53-65	Sandy clay loam, fine sandy loam	ML, CL, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	65-80	Sandy clay loam, fine sandy loam	ML, CL, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
KrdA:												
Kirkland----	0-10	Silt loam	CL, ML, CL-ML	A-4, A-6	0	0	100	100	96-100	80-97	22-37	2-13
	10-22	Silty clay, clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-65	18-38
	22-37	Silty clay, clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-65	18-38
	37-63	Silty clay, clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-65	18-38
	63-82	Clay, silty clay, clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	76-99	41-70	26-45
KrUA:												
Kirkland----	0-11	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	80-97	22-37	2-13
	11-28	Silty clay, clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-65	18-38
	28-48	Clay, silty clay, clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	76-99	41-70	26-45
	48-76	Clay, silty clay, clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	76-99	41-70	26-45
	76-84	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Urban land--	0-60	Variable	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
KUIC:												
Kingfisher--	0-11	Silt loam	CL, ML, CL-ML	A-4, A-6	0	0	100	100	96-100	80-97	22-37	2-13
	11-13	Silt loam, silty clay loam, clay loam	CL	A-4, A-6	0	0	100	100	96-100	80-98	30-40	8-17
	13-25	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	25-28	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Urban land--	0-60	Variable	---	---	---	---	---	---	---	---	---	---
Ironmound---	0-6	Loam	CL, CL-ML	A-4, A-6	0	0	85-100	85-100	76-100	52-97	24-35	4-13
	6-14	Loam, fine sandy loam, clay loam	CL, ML, CL-ML	A-4, A-6	0	0	85-100	80-100	76-100	52-85	14-35	2-18
	14-18	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
KwUD:												
Konawa------	0-7	Fine sandy loam	CL-ML, SM, ML, SC-SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	7-10	Fine sandy loam, loamy fine sand, fine sand	CL-ML, ML, SM, SC-SM	A-3, A-2, A-4	0	0	100	98-100	82-100	5-60	0-26	NP-7
	10-25	Sandy clay loam, fine sandy loam	CL, SM, ML, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	25-49	Sandy clay loam, fine sandy loam	ML, CL, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
	49-80	Fine sandy loam, sandy clay loam, loamy fine sand	CL-ML, ML, SM, SC-SM	A-4, A-2, A-6	0	0	100	98-100	90-100	15-65	0-37	NP-16
Urban land--	0-60	Variable	---	---	---	---	---	---	---	---	---	---
LarA:												
Lawrie------	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	70-97	22-37	2-14
	9-24	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	70-97	22-37	2-14
	24-40	Silty clay loam, silt loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	80-98	30-42	8-19
	40-67	Silty clay loam, silt loam	CL	A-6, A-4, A-7	0	0	100	100	96-100	80-98	30-42	8-19
	67-87	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-19

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*	*Pct*					*Pct*	
LatG:												
Latrass-----	0-5	Loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	65-85	22-37	2-14
	5-22	Clay loam, clay, silty clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-98	37-60	15-34
	22-42	Clay loam, clay, silty clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-98	37-60	15-34
	42-80	Variable	---	---	---	---	---	---	---	---	---	---
LawA:												
Lawrie------	0-9	Loam	CL-ML, CL, ML	A-4, A-6	0	0	100	100	96-100	70-97	22-37	2-14
	9-13	Silt loam, loam, silt loam	CL-ML, CL, ML	A-4, A-6	0	0	100	100	96-100	70-97	22-37	2-14
	13-18	Silty clay loam, silt loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	80-98	30-42	8-19
	18-47	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-19
	47-59	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-19
	59-82	Silty clay loam, clay loam, loam	CL, SC	A-4, A-6, A-7	0	0	100	100	90-100	36-98	30-50	9-26
LitB:												
Littleaxe---	0-5	Fine sandy loam	ML, SC-SM, CL-ML, SM	A-4	0	0	100	98-100	94-100	36-60	15-26	NP-7
	5-9	Loamy fine sand, fine sandy loam	ML, CL-ML, SC-SM, SM	A-2, A-4	0	0	100	98-100	90-100	15-60	0-26	NP-7
	9-17	Sandy clay loam, fine sandy loam	CL, ML, SM, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	2-16
	17-36	Sandy clay loam, fine sandy loam	CL, ML, SM, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	2-16
	36-43	Sandy clay loam, fine sandy loam	ML, CL, SC, SM	A-4, A-2, A-6	0	0	80-100	70-100	60-100	25-65	20-37	2-16
	43-45	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
LitC:												
Littleaxe---	0-6	Fine sandy loam	CL-ML, SM, ML, SC-SM	A-4	0	0	100	98-100	94-100	36-60	15-26	NP-7
	6-8	Loamy fine sand, fine sandy loam	CL-ML, SM, ML, SC-SM	A-2, A-4	0	0	100	98-100	90-100	15-60	0-26	NP-7
	8-33	Sandy clay loam, fine sandy loam	ML, CL, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	2-16
	33-52	Sandy clay loam, fine sandy loam	ML, CL, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	2-16
	52-59	Sandy clay loam, fine sandy loam	CL, SM, ML, SC	A-2, A-6, A-4	0	0	80-100	70-100	60-100	25-65	20-37	2-16
	59-72	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
LitC2:												
Littleaxe---	0-9	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	15-26	NP-7
	9-21	Sandy clay loam, fine sandy loam	ML, CL, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	2-16
	21-32	Sandy clay loam, fine sandy loam	ML, CL, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	2-16
	32-45	Sandy clay loam, fine sandy loam	CL, SM, ML, SC	A-2, A-6, A-4	0	0	80-100	70-100	60-100	25-65	20-37	2-16
	45-50	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
LomA:												
Lomill------	0-4	Silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	90-98	33-42	12-19
	4-12	Silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
	12-27	Silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
	27-48	Stratified loamy fine sand to silty clay	ML, CL, SC, SM	A-2, A-4, A-6	0	0	100	98-100	90-100	15-99	15-40	NP-18
	48-72	Stratified loamy fine sand to silty clay	ML, CL, SC, SM	A-4, A-2, A-6	0	0	100	98-100	90-100	15-99	15-40	NP-18

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
LtUC:												
Littleaxe---	0-6	Fine sandy loam	CL-ML, SM, ML, SC-SM	A-4	0	0	100	98-100	94-100	36-60	15-26	NP-7
	6-11	Loamy fine sand, fine sandy loam	ML, CL-ML, SC-SM, SM	A-2, A-4	0	0	100	98-100	90-100	15-60	0-26	NP-7
	11-25	Sandy clay loam, fine sandy loam	ML, CL, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	2-16
	25-32	Sandy clay loam, fine sandy loam	CL, SM, ML, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	2-16
	32-44	Sandy clay loam, fine sandy loam	CL, SM, ML, SC	A-2, A-4, A-6	0	0	80-100	70-100	60-100	25-65	20-37	2-16
	44-50	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Urban land--	0-60	Variable	---	---	---	---	---	---	---	---	---	---
LweA:												
Lawrie------	0-11	Silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	90-98	33-50	12-25
	11-21	Silty clay loam, silt loam	CL	A-4, A-7, A-6	0	0	100	100	96-100	80-98	30-42	8-19
	21-34	Silty clay loam, silt loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	80-98	30-42	8-19
	34-55	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-19
	55-80	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-19
LwfA:												
Lawrie------	0-14	Fine sandy loam	ML, SC-SM, CL-ML, SM	A-4	0	0	100	98-100	94-100	36-60	0-26	NP-7
	14-33	Silty clay loam, silt loam, loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-19
	33-57	Silt loam, loam, silty clay loam	CL	A-4, A-7, A-6	0	0	100	100	96-100	65-98	30-43	8-19
	57-70	Silt loam, loam, silty clay loam	CL	A-6, A-4, A-7	0	0	100	100	96-100	65-98	30-43	8-19
	70-96	Silty clay loam, clay loam, loam	CL, SC	A-4, A-6, A-7	0	0	100	100	90-100	36-98	30-50	9-26

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
LwUA:												
Lawrie------	0-9	Silt loam	CL-ML, CL, ML	A-4, A-6	0	0	100	100	96-100	70-97	22-37	2-14
	9-17	Silty clay loam, silt loam	CL	A-4, A-7, A-6	0	0	100	100	96-100	80-98	30-42	8-19
	17-24	Silty clay loam, silt loam	CL	A-6, A-4, A-7	0	0	100	100	96-100	80-98	30-42	8-19
	24-33	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-19
	33-45	Silt loam, loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-19
	45-84	Silty clay loam, clay loam, loam	CL, SC	A-4, A-6, A-7	0	0	100	100	90-100	36-98	30-50	9-26
Urban land--	0-60	Variable	---	---	---	---	---	---	---	---	---	---
MlfA:												
Miller------	0-19	Fine sandy loam	CL-ML, ML, SM, SC-SM	A-4	0	0	100	98-100	94-100	36-85	22-29	NP-7
	19-29	Clay, silty clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-60	18-35
	29-37	Clay, silty clay, silty clay loam	CH, CL	A-7	0	0	100	98-100	96-100	90-99	41-65	20-40
	37-96	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	98-100	96-100	80-99	35-60	15-35
MllA:												
Miller------	0-7	Silty clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-60	18-35
	7-12	Silty clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-60	18-35
	12-24	Clay, silty clay, silty clay loam	CH, CL	A-7	0	0	100	98-100	96-100	90-99	41-65	20-40
	24-70	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	98-100	96-100	80-99	35-60	15-35
	70-84	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	98-100	96-100	80-99	35-60	15-35
M-W:												
Miscellaneous water												

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*	*Pct*					*Pct*	
NewB:												
Newalla-----	0-4	Fine sandy loam	CL-ML, ML, SM, SC-SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	4-8	Fine sandy loam	CL-ML, SM, ML, SC-SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	8-16	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	96-100	36-85	25-40	7-18
	16-32	Clay, silty clay	CH, CL	A-7	0	0	100	100	96-100	80-99	41-60	18-34
	32-42	Sandy clay, very gravelly silty clay, silty clay	CH, SC, CL, GC	A-2, A-6, A-7	0	0	40-100	35-100	30-100	15-99	35-60	14-34
	42-48	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
NewC2:												
Newalla-----	0-6	Fine sandy loam	ML, SC-SM, CL-ML, SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	6-10	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	96-100	36-85	25-40	7-18
	10-38	Clay, silty clay	CH, CL	A-7	0	0	100	100	96-100	80-99	41-60	18-34
	38-55	Clay, silty clay	CH, CL	A-7	0	0	100	100	96-100	80-99	41-60	18-34
	55-60	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
NorB:												
Norge-------	0-12	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	65-97	22-35	2-14
	12-18	Silty clay loam, clay loam, silt loam	CL-ML, CL, ML	A-4, A-6, A-7	0	0	100	100	96-100	65-98	22-43	2-20
	18-27	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	27-43	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	43-86	Silty clay loam, clay loam, silty clay	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-49	12-22

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
NorC:												
Norge-------	0-9	Silt loam	CL, ML, CL-ML	A-4, A-6	0	0	100	100	96-100	65-97	22-35	2-14
	9-14	Silty clay loam, clay loam, silt loam	CL, ML, CL-ML	A-4, A-6, A-7	0	0	100	100	96-100	65-98	22-43	2-20
	14-39	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	39-68	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	68-88	Silty clay loam, clay loam, silty clay	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-49	12-22
NorC2:												
Norge-------	0-10	Silt loam	CL-ML, CL, ML	A-4, A-6	0	0	100	100	96-100	65-97	22-35	2-14
	10-30	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	30-49	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	49-63	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	63-84	Silty clay loam, clay loam, silty clay	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-49	12-22
NoUC:												
Norge-------	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	65-97	22-35	2-14
	9-16	Silty clay loam, clay loam, silt loam	CL-ML, CL, ML	A-4, A-6, A-7	0	0	100	100	96-100	65-98	22-43	2-20
	16-46	Silty clay loam, clay loam, silt loam	CL, CL-ML, ML	A-6, A-4, A-7	0	0	100	100	96-100	65-98	22-43	2-20
	46-68	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	68-84	Silty clay loam, clay loam, silty clay	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-49	12-22
Urban land--	0-60	Variable	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*	*Pct*					*Pct*	
PdHC:												
Piedmont----	0-7	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	80-97	30-37	8-13
	7-10	Clay loam, silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-50	13-26
	10-15	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	15-25	Silty clay, clay, gravelly silty clay	CL, CH, GC, SC	A-6, A-7	0	0	50-100	50-100	45-100	45-99	37-60	15-34
	25-37	Silty clay, clay, gravelly silty clay	CL, CH, GC, SC	A-6, A-7	0	0	50-100	50-100	45-100	45-99	37-60	15-34
	37-45	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Huska-------	0-3	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	94-100	51-97	24-37	5-14
	3-18	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	18-40	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	40-45	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
PieC2:												
Piedmont----	0-4	Silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-43	10-20
	4-20	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	20-32	Gravelly silty clay loam, clay, gravelly silty clay, silty clay	CL, GC, CH, SC	A-6, A-7	0	0	50-100	50-100	45-100	45-99	37-60	15-34
	32-40	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
PimB:												
Piedmont----	0-4	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	80-97	30-37	8-13
	4-8	Clay loam, silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-50	13-26
	8-16	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	16-30	Silty clay, clay, gravelly silty clay	CH, SC, CL, GC	A-6, A-7	0	0	50-100	50-100	45-100	45-99	37-60	15-34
	30-36	Silty clay, clay, gravelly silty clay	CH, CL, SC, GC	A-6, A-7	0	0	50-100	50-100	45-100	45-99	37-60	15-34
	36-48	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
PimC:												
Piedmont----	0-4	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	80-97	30-37	8-13
	4-6	Clay loam, silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-50	13-26
	6-23	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	23-31	Silty clay, clay, gravelly silty clay	CH, SC, CL, GC	A-6, A-7	0	0	50-100	50-100	45-100	45-99	37-60	15-34
	31-40	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
PIT:												
Pits--------	0-60	Variable	---	---	---	---	---	---	---	---	---	---
PukA:												
Pulaski-----	0-9	Fine sandy loam	CL-ML, ML, SM, SC-SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	9-14	Fine sandy loam, loam	ML, SC-SM, CL-ML, SM	A-4	0	0	100	98-100	94-100	36-85	14-29	NP-7
	14-55	Fine sandy loam, loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-85	14-29	NP-7
	55-79	Stratified loamy fine sand to loam	CL-ML, SM, ML, SC-SM	A-2, A-4	0	0	100	98-100	94-100	15-85	0-29	NP-7
PulA:												
Pulaski-----	0-5	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	5-17	Fine sandy loam, loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-85	14-29	NP-7
	17-34	Fine sandy loam, loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-85	14-29	NP-7
	34-72	Stratified loamy fine sand to loam	CL-ML, SM, ML, SC-SM	A-2, A-4	0	0	100	98-100	94-100	15-85	0-29	NP-7
RenB:												
Renfrow-----	0-8	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	65-97	30-37	8-14
	8-15	Silty clay loam, clay loam, silt loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	30-50	15-26
	15-41	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	41-68	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	68-99	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
RinB:												
Renthin-----	0-4	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	65-97	30-37	8-13
	4-10	Clay loam, silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-50	13-26
	10-29	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	29-55	Silty clay, clay, gravelly silty clay	CL, CH, GC, SC	A-6, A-7	0	0	50-100	50-100	45-100	40-99	37-60	15-34
	55-77	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
RnnB:												
Renthin-----	0-10	Silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-43	10-20
	10-16	Clay loam, silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-50	13-26
	16-26	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	26-34	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	34-44	Silty clay, clay, gravelly silty clay	CH, SC, CL, GC	A-6, A-7	0	0	50-100	50-100	45-100	40-99	37-60	15-34
	44-50	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
RnnC2:												
Renthin-----	0-8	Silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-43	10-20
	8-12	Clay loam, silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-50	13-26
	12-19	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	19-55	Silty clay, clay, gravelly silty clay	CH, SC, CL, GC	A-6, A-7	0	0	50-100	50-100	45-100	40-99	37-60	15-34
	55-60	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
RnUC:												
Renthin-----	0-10	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	65-97	30-37	8-13
	10-14	Clay loam, silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-50	13-26
	14-51	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	51-58	Silty clay, clay, gravelly silty clay	CL, CH, GC, SC	A-6, A-7	0	0	50-100	50-100	45-100	40-99	37-60	15-34
	58-72	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Urban land--	0-60	Variable	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
SDGD4:												
Stephenville	0-4	Fine sandy loam	CL-ML, ML, SM, SC-SM	A-2, A-4	0	0-15	83-100	83-100	80-100	11-60	14-26	NP-7
	4-20	Fine sandy loam, sandy clay loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	20-30	Fine sandy loam, sandy clay loam	CL-ML, SC, CL, SC-SM	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	30-40	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Darsil------	0-6	Loamy fine sand	SM	A-2	0	0	98-100	98-100	85-100	15-35	0-14	NP
	6-10	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	75-100	70-100	50-100	5-35	0-14	NP
	10-15	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Gullied land	0-60	Variable	---	---	---	---	---	---	---	---	---	---
SDND:												
Stephenville	0-3	Fine sandy loam	CL-ML, SM, ML, SC-SM	A-2, A-4	0	0-15	83-100	83-100	80-100	11-60	14-26	NP-7
	3-10	Fine sandy loam, loamy fine sand	ML, CL-ML, SC-SM, SM	A-2, A-4	0	0-15	85-100	85-100	76-100	12-60	0-26	NP-7
	10-21	Fine sandy loam, sandy clay loam	CL, SC-SM, CL-ML, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	21-24	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Darsil------	0-5	Loamy fine sand	SM	A-2	0	0	98-100	98-100	85-100	15-35	0-14	NP
	5-16	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	75-100	70-100	50-100	5-35	0-14	NP
	16-18	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Newalla-----	0-3	Fine sandy loam	CL-ML, ML, SM, SC-SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	3-10	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	10-15	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	96-100	36-85	25-40	7-18
	15-30	Clay, silty clay	CH, CL	A-7	0	0	100	100	96-100	80-99	41-60	18-34
	30-41	Clay, silty clay	CH, CL	A-7	0	0	100	100	96-100	80-99	41-60	18-34
	41-45	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
SDND2:												
Stephenville	0-4	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-2, A-4	0	0-15	83-100	83-100	80-100	11-60	14-26	NP-7
	4-17	Fine sandy loam, sandy clay loam	CL, CL-ML, SC-SM, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	17-24	Fine sandy loam, sandy clay loam	CL, SC-SM, CL-ML, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	24-29	Fine sandy loam, sandy clay loam	CL-ML, SC, CL, SC-SM	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	29-31	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Darsil------	0-6	Loamy fine sand	SM	A-2	0	0	98-100	98-100	85-100	15-35	0-14	NP
	6-14	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	75-100	70-100	50-100	5-35	0-14	NP
	14-16	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Newalla-----	0-6	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	6-14	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	96-100	36-85	25-40	7-18
	14-44	Clay, silty clay	CH, CL	A-7	0	0	100	100	96-100	80-99	41-60	18-34
	44-50	Sandy clay, very gravelly silty clay, silty clay	CH, SC, CL, GC	A-2, A-6, A-7	0	0	40-100	35-100	30-100	15-99	35-60	14-34
	50-55	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
StDC:												
Stephenville	0-5	Fine sandy loam	CL-ML, SM, ML, SC-SM	A-2, A-4	0	0-15	83-100	83-100	80-100	11-60	14-26	NP-7
	5-8	Fine sandy loam, loamy fine sand	ML, SC-SM, CL-ML, SM	A-2, A-4	0	0-15	85-100	85-100	76-100	12-60	0-26	NP-7
	8-20	Fine sandy loam, sandy clay loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	20-27	Fine sandy loam, sandy clay loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	27-32	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Darsil------	0-4	Loamy fine sand	SM	A-2	0	0	98-100	98-100	85-100	15-35	0-14	NP
	4-16	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	75-100	70-100	50-100	5-35	0-14	NP
	16-24	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
StDC2:												
Stephenville	0-3	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-2, A-4	0	0-15	83-100	83-100	80-100	11-60	14-26	NP-7
	3-6	Fine sandy loam, sandy clay loam	CL-ML, SC, CL, SC-SM	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	6-17	Fine sandy loam, sandy clay loam	CL, SC-SM, CL-ML, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	17-26	Fine sandy loam, sandy clay loam	CL, SC-SM, CL-ML, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	26-42	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Darsil------	0-4	Loamy fine sand	SM	A-2	0	0	98-100	98-100	85-100	15-35	0-14	NP
	4-15	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	75-100	70-100	50-100	5-35	0-14	NP
	15-20	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
StLC4:												
Stephenville	0-6	Fine sandy loam	CL-ML, SM, ML, SC-SM	A-2, A-4	0	0-15	83-100	83-100	80-100	11-60	14-26	NP-7
	6-20	Fine sandy loam, sandy clay loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	20-30	Fine sandy loam, sandy clay loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	30-40	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Littleaxe---	0-10	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	15-26	NP-7
	10-24	Sandy clay loam, fine sandy loam	CL, SM, ML, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	2-16
	24-42	Sandy clay loam, fine sandy loam	CL, ML, SM, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	2-16
	42-52	Sandy clay loam, fine sandy loam	ML, CL, SC, SM	A-2, A-4, A-6	0	0	80-100	70-100	60-100	25-65	20-37	2-16
	52-56	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*	*Pct*					*Pct*	
SUND:												
Stephenville	0-5	Fine sandy loam	ML, SC-SM, CL-ML, SM	A-2, A-4	0	0-15	83-100	83-100	80-100	11-60	14-26	NP-7
	5-9	Fine sandy loam, loamy fine sand	ML, CL-ML, SC-SM, SM	A-2, A-4	0	0-15	85-100	85-100	76-100	12-60	0-26	NP-7
	9-22	Fine sandy loam, sandy clay loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	22-28	Fine sandy loam, sandy clay loam	CL, SC-SM, CL-ML, SC	A-4, A-6	0	0	100	98-100	90-100	36-65	20-37	7-16
	28-35	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Urban land--	0-60	Variable	---	---	---	---	---	---	---	---	---	---
Newalla-----	0-6	Loam	CL, CL-ML, SC	A-4, A-6	0	0	100	100	96-100	36-85	25-37	7-16
	6-11	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	96-100	36-85	25-40	7-18
	11-58	Clay, silty clay	CH, CL	A-7	0	0	100	100	96-100	80-99	41-60	18-34
	11-58	Clay, silty clay	CH, CL	A-7	0	0	100	100	96-100	80-99	41-60	18-34
	58-72	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
TevD:												
Teval-------	0-7	Loam	CL, CL-ML, ML	A-4, A-6	0	0	100	98-100	94-100	63-97	22-35	2-13
	7-11	Loam, clay loam, sandy clay loam	CL, ML, SC	A-4, A-6	0	0	100	98-100	88-100	35-90	25-40	7-18
	11-20	Loam, clay loam, sandy clay loam	CL, ML, SC	A-2, A-4, A-6	0	0	90-100	85-100	76-100	30-90	25-40	7-18
	20-38	Loam, clay loam, sandy clay loam	CL, ML, SC	A-2, A-4, A-6	0	0	90-100	85-100	76-100	30-90	25-40	7-18
	38-50	Stratified fine sand to very gravelly clay loam	GM, GC, SC, SM	A-2, A-6, A-4	0	0	65-95	63-85	58-85	23-72	0-40	NP-18
	50-96	Stratified very gravelly fine sand to very gravelly clay loam	GM, GC, SC, SM	A-2, A-4, A-1, A-6	0	0	41-75	39-65	36-65	14-55	0-40	NP-18

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
TevD2:												
Teval-------	0-5	Loam	CL, CL-ML, ML	A-4, A-6	0	0	100	98-100	94-100	63-97	22-35	2-13
	5-9	Loam, clay loam, sandy clay loam	CL, ML, SC	A-4, A-6	0	0	100	98-100	88-100	35-90	25-40	7-18
	9-21	Loam, clay loam, sandy clay loam	CL, SC, ML	A-2, A-4, A-6	0	0	90-100	85-100	76-100	30-90	25-40	7-18
	21-51	Stratified fine sand to very gravelly clay loam	GM, GC, SC, SM	A-2, A-6, A-4	0	0	65-95	63-85	58-85	23-72	0-40	NP-18
	51-72	Stratified very gravelly fine sand to very gravelly clay loam	GC, SM, GM, SC	A-2, A-4, A-1, A-6	0	0	41-75	39-65	36-65	14-55	0-40	NP-18
TlrB:												
Teller------	0-10	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	10-18	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	18-29	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	29-38	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	38-47	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	47-84	Fine sandy loam, very fine sandy loam, loam	ML, CL, SC, SM	A-4, A-6	0	0	100	98-100	94-100	36-85	14-35	NP-13
TlrC:												
Teller------	0-12	Fine sandy loam	CL-ML, ML, SM, SC-SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	12-17	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	17-33	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	33-46	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	46-57	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	57-79	Fine sandy loam, very fine sandy loam, loam	CL, ML, SM, SC	A-4, A-6	0	0	100	98-100	94-100	36-85	14-35	NP-13

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*	*Pct*					*Pct*	
TlrC2:												
Teller------	0-10	Loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	50-85	22-29	2-7
	10-17	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	17-33	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	33-50	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	50-74	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	74-84	Fine sandy loam, very fine sandy loam, loam	ML, SC, CL, SM	A-4, A-6	0	0	100	98-100	94-100	36-85	14-35	NP-13
TlrD:												
Teller------	0-12	Loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	50-85	22-29	2-7
	12-17	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	17-30	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	30-48	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	48-60	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	60-79	Fine sandy loam, very fine sandy loam, loam	ML, CL, SC, SM	A-4, A-6	0	0	100	98-100	94-100	36-85	14-35	NP-13
TlUD:												
Teller------	0-11	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	11-17	Fine sandy loam, very fine sandy loam, loam	CL, ML, SM, SC	A-4, A-6	0	0	100	98-100	94-100	36-85	14-35	NP-13
	17-27	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	27-43	Sandy clay loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-85	25-40	7-18
	43-58	Fine sandy loam, very fine sandy loam, loam	CL, ML, SM, SC	A-4, A-6	0	0	100	98-100	94-100	36-85	14-35	NP-13
	58-74	Fine sandy loam, very fine sandy loam, loam	ML, SC, CL, SM	A-4, A-6	0	0	100	98-100	94-100	36-85	14-35	NP-13

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
TlUD:												
Urban land--	0-79	Variable	---	---	---	---	---	---	---	---	---	---
TriA:												
Tribbey-----	0-8	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	8-15	Loam, fine sandy loam, loamy very fine sand	CL-ML, SM, ML, SC-SM	A-4	0	0	100	98-100	90-100	15-85	0-29	NP-7
	15-62	Stratified loamy fine sand to loam	CL-ML, ML, SM, SC-SM	A-2, A-4	0	0	100	98-100	90-100	15-85	0-29	NP-7
	62-80	Loam, clay loam, fine sandy loam	CL-ML, CL, ML, SM	A-4, A-6	0	0	100	98-100	94-100	36-90	14-40	NP-18
URB:												
Urban land--	0-80	Variable	---	---	---	---	---	---	---	---	---	---
VanA:												
Vanoss------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	65-95	22-35	2-14
	8-14	Loam, silt loam, clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-20
	14-30	Clay loam, silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	30-39	Clay loam, silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	39-59	Loam, silt loam, clay loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-20
	59-76	Sandy clay loam, fine sandy loam	CL-ML, SC, CL, SC-SM	A-4, A-6	0	0	95-100	95-100	90-100	36-65	20-37	5-16
VanB:												
Vanoss------	0-8	Silt loam	CL, ML, CL-ML	A-4, A-6	0	0	100	100	96-100	65-95	22-35	2-14
	8-14	Loam, silt loam, clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-20
	14-19	Loam, silt loam, clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-20
	19-33	Clay loam, silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	33-52	Silty clay loam, silt loam, clay loam, loam	CL, ML, SM, SC	A-4, A-6, A-7	0	0	100	98-100	94-100	36-95	20-43	2-20
	52-80	Sandy clay loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0	0	95-100	95-100	90-100	36-65	20-37	5-16
W:												
Water.												

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
WauA:												
Waurika-----	0-10	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	80-97	30-37	9-14
	10-13	Silt loam, loam	CL-ML, CL, ML	A-4, A-6	0	0	100	100	96-100	60-95	22-35	2-14
	13-38	Clay, silty clay	CH, CL	A-7	0	0	95-100	95-100	90-100	80-98	41-66	20-40
	38-69	Silty clay loam, clay loam, clay	CH, CL	A-6, A-7	0	0	90-100	90-100	85-100	80-98	38-55	16-30
	69-84	Clay loam, silty clay loam, silty clay	CL	A-6, A-7	0	0	90-100	90-100	80-100	70-98	33-66	12-40
WtgA:												
Watonga-----	0-9	Silty clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-70	26-45
	9-25	Silty clay, clay, silty clay loam	CH, CL	A-7	0	0	100	100	96-100	90-99	41-71	26-45
	25-42	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-70	26-45
	42-80	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
WuUA:												
Watonga-----	0-13	Silty clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-70	26-45
	13-34	Silty clay, clay, silty clay loam	CH, CL	A-7	0	0	100	100	96-100	90-99	41-71	26-45
	34-54	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-70	26-45
	54-80	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
Urban land--	0-80	Variable	---	---	---	---	---	---	---	---	---	---
YaGA:												
Yahola------	0-10	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	10-24	Fine sandy loam, loam, very fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-85	14-29	NP-10
	24-42	Fine sandy loam, loam, very fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-85	14-29	NP-10
	42-79	Stratified loamy fine sand to loam	CL-ML, SM, ML, SC-SM	A-2, A-4	0	0	100	98-100	90-100	15-97	0-30	NP-10

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
YaGA:												
Gaddy-------	0-8	Fine sandy loam	ML, SC-SM, CL-ML, SM	A-4	0	0	100	95-100	70-100	36-60	15-26	NP-7
	8-21	Stratified fine sand to clay loam	ML, CL, SM, SP-SM	A-2, A-3, A-6, A-4	0	0	100	98-100	80-100	5-90	0-40	NP-18
	21-80	Stratified fine sand to clay loam	ML, CL, SM, SP-SM	A-3, A-2, A-4, A-6	0	0	100	98-100	80-100	5-90	0-40	NP-18
YahA:												
Yahola------	0-6	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	6-11	Fine sandy loam, loam, very fine sandy loam	CL-ML, SM, ML, SC-SM	A-4	0	0	100	98-100	94-100	36-85	14-29	NP-10
	11-71	Stratified loamy fine sand to loam	ML, CL-ML, SC-SM, SM	A-2, A-4	0	0	100	98-100	90-100	15-97	0-30	NP-10
	71-96	Stratified loamy fine sand to loam	ML, CL-ML, SC-SM, SM	A-2, A-4	0	0	100	98-100	90-100	15-97	0-30	NP-10
YaUA:												
Yahola------	0-4	Loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-85	14-29	NP-10
	4-22	Fine sandy loam, loam, very fine sandy loam	CL-ML, ML, SM, SC-SM	A-4	0	0	100	98-100	94-100	36-85	14-29	NP-10
	22-48	Fine sandy loam, loam, very fine sandy loam	ML, CL-ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-85	14-29	NP-10
	48-80	Stratified loamy fine sand to loam	CL-ML, SM, ML, SC-SM	A-2, A-4	0	0	100	98-100	90-100	15-97	0-30	NP-10
Urban land--	0-80	Variable	---	---	---	---	---	---	---	---	---	---
ZanB:												
Zaneis------	0-9	Loam	CL, ML	A-4, A-6	0	0	100	98-100	91-100	65-85	30-35	9-13
	9-14	Loam, clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	14-35	Clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	35-54	Clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	54-59	Clay loam, sandy clay loam, fine sandy loam	CL-ML, SC, CL, SC-SM	A-2, A-4, A-6	0	0-10	90-100	88-100	81-100	32-85	20-40	4-18
	59-72	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
ZanC:												
Zaneis------	0-12	Loam	CL, ML	A-4, A-6	0	0	100	98-100	91-100	65-85	30-35	9-13
	12-19	Loam, clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	19-31	Clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	31-48	Clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	48-59	Clay loam, sandy clay loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-2, A-4, A-6	0	0-10	90-100	88-100	81-100	32-85	20-40	4-18
	59-65	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
ZanC2:												
Zaneis------	0-12	Loam	CL, ML	A-4, A-6	0	0	100	98-100	91-100	65-85	30-35	9-13
	12-30	Loam, clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	30-40	Clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	40-47	Clay loam, sandy clay loam, fine sandy loam	CL-ML, CL, SC, SC-SM	A-2, A-6, A-4	0	0-10	90-100	88-100	81-100	32-85	20-40	4-18
	47-55	Clay loam, sandy clay loam, fine sandy loam	CL, SC-SM, CL-ML, SC	A-2, A-4, A-6	0	0-10	90-100	88-100	81-100	32-85	20-40	4-18
	55-65	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
ZaUC:												
Zaneis------	0-10	Loam	CL, ML	A-4, A-6	0	0	100	98-100	91-100	65-85	30-35	9-13
	10-16	Loam, clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	16-23	Clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	23-32	Clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	32-42	Clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	42-50	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Urban land--	0-60	Variable	---	---	---	---	---	---	---	---	---	---

Physical Properties

The table “Physical Properties of the Soils” shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the series descriptions in Part I of this survey.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. The estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In the table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K_{sat}) refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Erosion factors.—Soil erodibility (K) and soil-loss tolerance (T) factors are used in an equation that predicts the amount of soil lost through water erosion in areas of cropland. The procedure for predicting soil loss is useful in guiding the selection of soil and water conservation practices.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average rate of soil loss by sheet and rill erosion in tons per acre per year. The soil properties that influence erodibility are those that affect the infiltration rate, the movement of water through the soil, and the water storage capacity of the soil and those that allow the soil to resist dispersion, splashing, abrasion, and the transporting forces of rainfall and runoff. The most important soil properties

are the content of silt plus very fine sand, the content of sand coarser than very fine sand, the content of organic matter, soil structure, and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.64. The higher the value, the more susceptible the soil is to sheet and rill erosion.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence or rock fragments,

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size. This is one of the factors used in the Revised Universal Soil Loss Equation.

Erosion factor T is an estimate of the maximum annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons of soil loss per acre per year. Ratings of 1 to 5 are used, depending on soil properties and prior erosion. The criteria used in assigning a T factor to a soil include maintenance of an adequate rooting depth for crop production, potential reduction of crop yields, maintenance of water-control structures affected by sedimentation, prevention of gullying, and the value of nutrients lost through erosion.

Wind erodibility groups.—Wind erodibility is directly related to the percentage of dry, nonerodible surface soil aggregates larger than 0.84 millimeter in diameter. From this percentage, the wind erodibility index factor (I) is determined. This factor is an expression of the stability of the soil aggregates, or the extent to which they are broken down by tillage and the abrasion caused by windblown soil particles. Soils are assigned to wind erodibility groups (WEGs) having similar percentages of dry soil aggregates larger than 0.84 millimeter.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

WEG 1. Very fine sand, fine sand, sand, and coarse sand.

WEG 2. Loamy very fine sand, loamy fine sand, loamy sand, loamy coarse sand, ash, and sapric organic soil material.

WEG 3. Very fine sandy loam, fine sandy loam, sandy loam, and coarse sandy loam.

WEG 4. Clay, silty clay, and noncalcareous clay loam and silty clay loam with more than 35 percent clay.

WEG 4L. Calcareous loam, silt loam, clay loam, and silty clay loam characterized by a strongly effervescent or violently effervescent reaction to cold dilute (1N) HCl.

WEG 5. Noncalcareous loam and silt loam with less than 20 percent clay and sandy clay loam, sandy clay, and hemic organic soil material.

WEG 6. Noncalcareous loam and silt loam with more than 20 percent clay and noncalcareous clay loam with less than 35 percent clay.

WEG 7. Silt, noncalcareous silty clay loam with less than 35 percent clay, and fibric organic soil material.

WEG 8. Soils that are not susceptible to soil blowing because of rock fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to soil blowing, or the tons per acre per year that can be expected to be lost to soil blowing. There is a close correlation between soil blowing and the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence soil blowing.

Additional information about wind erodibility groups and K, Kf, T, and I factors can be obtained from local offices of the Natural Resources Conservation Service or the Cooperative Extension Service.

Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
AhpA:												
Ashport---------------	0-5	27-35	1.30-1.60	0.60-2.00	0.15-0.22	3.0-5.9	1.0-3.0	.32	.32	5	7	38
	5-14	27-35	1.30-1.60	0.60-2.00	0.15-0.22	3.0-5.9	1.0-3.0	.32	.32			
	14-36	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
	36-96	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
AmbE:												
Amber-----------------	0-9	10-18	1.30-1.55	0.60-2.00	0.13-0.20	0.0-2.9	0.5-1.0	.37	.37	5	3	86
	9-11	10-18	1.30-1.55	0.60-2.00	0.13-0.20	0.0-2.9	0.5-1.0	.37	.37			
	11-22	10-18	1.30-1.60	0.60-2.00	0.13-0.20	0.0-2.9	0.5-1.0	.37	.37			
	22-38	5-18	1.30-1.60	0.60-2.00	0.13-0.24	0.0-2.9	0.5-1.0	.37	.37			
	38-84	5-35	1.30-1.70	0.00-2.00	0.13-0.22	0.0-2.9	0.0-0.8	.37	.37			
AshA:												
Asher-----------------	0-8	27-40	1.30-1.60	0.06-0.20	0.18-0.22	3.0-5.9	1.0-3.0	.37	.37	5	7	38
	8-14	27-40	1.30-1.60	0.06-0.20	0.18-0.22	3.0-5.9	1.0-3.0	.37	.37			
	14-31	27-40	1.45-1.70	0.06-0.20	0.18-0.22	3.0-5.9	0.5-2.0	.37	.37			
	31-88	8-18	1.40-1.65	0.60-2.00	0.07-0.24	0.0-2.9	0.0-1.0	.37	.37			
AspA:												
Ashport---------------	0-7	15-26	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	7-15	15-26	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.37	.37			
	15-29	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
	29-72	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
	72-83	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
AstA:												
Ashport---------------	0-10	15-26	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	10-24	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
	24-36	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
	36-48	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
	48-64	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
BetA:												
Bethany---------------	0-6	15-26	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.43	.43	5	5	56
	6-14	15-26	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.43	.43			
	14-18	27-35	1.45-1.70	0.20-0.60	0.16-0.22	3.0-5.9	1.0-3.0	.37	.37			
	18-36	35-50	1.40-1.70	0.06-0.20	0.12-0.22	6.0-8.9	0.5-2.0	.37	.37			
	36-56	35-50	1.40-1.70	0.06-0.20	0.12-0.22	6.0-8.9	0.0-2.0	.37	.37			
	56-80	35-50	1.40-1.70	0.06-0.20	0.12-0.22	6.0-8.9	0.0-2.0	.37	.37			
BetB:												
Bethany---------------	0-6	15-26	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.43	.43	5	5	56
	6-13	15-26	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.43	.43			
	13-19	27-35	1.45-1.70	0.20-0.60	0.16-0.22	3.0-5.9	1.0-3.0	.37	.37			
	19-32	35-50	1.40-1.70	0.06-0.20	0.12-0.22	6.0-8.9	0.5-2.0	.37	.37			
	32-59	35-50	1.40-1.70	0.06-0.20	0.12-0.22	6.0-8.9	0.0-2.0	.37	.37			
	59-84	35-50	1.40-1.70	0.06-0.20	0.12-0.22	6.0-8.9	0.0-2.0	.37	.37			
BeUB:												
Bethany---------------	0-12	15-26	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.43	.43	5	5	56
	12-16	27-35	1.45-1.70	0.20-0.60	0.16-0.22	3.0-5.9	1.0-3.0	.37	.37			
	16-28	35-50	1.40-1.70	0.06-0.20	0.12-0.22	6.0-8.9	0.5-2.0	.37	.37			
	28-55	35-50	1.40-1.70	0.06-0.20	0.12-0.22	6.0-8.9	0.0-2.0	.37	.37			
	55-84	35-50	1.40-1.70	0.06-0.20	0.12-0.22	6.0-8.9	0.0-2.0	.37	.37			
Urban land------------	0-80	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
CaaA:												
Canadian--------------	0-8	5-18	1.40-1.65	2.00-6.00	0.10-0.15	0.0-2.9	1.0-3.0	.20	.20	5	3	86
	8-19	10-18	1.35-1.70	2.00-6.00	0.10-0.20	0.0-2.9	0.0-2.0	.20	.20			
	19-30	10-18	1.35-1.70	2.00-6.00	0.10-0.20	0.0-2.9	0.0-2.0	.20	.20			
	30-80	5-18	1.40-1.70	2.00-20.00	0.07-0.20	0.0-2.9	0.0-1.0	.20	.20			
CaUB:												
Canadian--------------	0-8	5-18	1.40-1.65	2.00-6.00	0.10-0.15	0.0-2.9	1.0-3.0	.20	.20	5	3	86
	8-18	10-18	1.35-1.70	2.00-6.00	0.10-0.20	0.0-2.9	0.0-2.0	.20	.20			
	18-28	10-18	1.35-1.70	2.00-6.00	0.10-0.20	0.0-2.9	0.0-2.0	.20	.20			
	28-43	5-18	1.40-1.70	2.00-20.00	0.07-0.20	0.0-2.9	0.0-1.0	.20	.20			
	43-52	5-18	1.40-1.70	2.00-20.00	0.07-0.20	0.0-2.9	0.0-1.0	.20	.20			
	52-84	5-18	1.40-1.70	2.00-20.00	0.07-0.20	0.0-2.9	0.0-1.0	.20	.20			
Urban land------------	0-60	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
CoIC2:												
Coyle-----------------	0-10	15-26	1.30-1.55	0.60-2.00	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	3	6	48
	10-13	18-26	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.5-2.0	.37	.37			
	13-24	20-35	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32			
	24-31	18-35	1.40-1.70	0.60-2.00	0.07-0.20	0.0-2.9	0.0-0.5	.28	.32			
	31-36	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
Ironmound-------------	0-7	10-18	1.30-1.60	2.00-6.00	0.11-0.15	0.0-2.9	1.0-3.0	.20	.20	2	3	86
	7-12	10-27	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.0-0.5	.32	.32			
	12-15	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
CoUB:												
Coyle-----------------	0-8	15-26	1.30-1.55	0.60-2.00	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	3	6	48
	8-14	18-26	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.5-2.0	.37	.37			
	14-22	20-35	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32			
	22-30	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
Urban land------------	0-60	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
CoyB:												
Coyle-----------------	0-7	15-26	1.30-1.55	0.60-2.00	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	3	6	48
	7-10	18-26	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.5-2.0	.37	.37			
	10-20	20-35	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32			
	20-27	18-35	1.40-1.70	0.60-2.00	0.07-0.20	0.0-2.9	0.0-0.5	.28	.32			
	27-40	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
DalA:												
Dale------------------	0-8	15-26	1.30-1.50	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	8-14	15-26	1.30-1.50	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37			
	14-21	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	1.0-2.0	.37	.37			
	21-27	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	1.0-2.0	.37	.37			
	27-53	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.37	.37			
	53-84	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.37	.37			
DAM:												
Dams------------------	0-80	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
DaUA:												
Dale------------------	0-8	15-26	1.30-1.50	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	8-22	15-26	1.30-1.50	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37			
	22-30	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	1.0-2.0	.37	.37			
	30-38	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	1.0-2.0	.37	.37			
	38-52	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.37	.37			
	52-84	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.37	.37			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
DaUA:												
Urban land------------	0-84	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
DeDE:												
Derby-----------------	0-15	2-8	1.35-1.50	6.00-20.00	0.07-0.11	0.0-2.9	0.5-1.0	.15	.15	5	2	134
	15-27	1-10	1.50-1.70	6.00-20.00	0.05-0.11	0.0-2.9	0.0-0.5	.15	.15			
	27-45	1-10	1.50-1.70	6.00-20.00	0.05-0.11	0.0-2.9	0.0-0.5	.15	.15			
	45-61	1-10	1.50-1.70	6.00-20.00	0.05-0.11	0.0-2.9	0.0-0.5	.15	.15			
	61-72	1-10	1.50-1.70	6.00-20.00	0.05-0.11	0.0-2.9	0.0-0.5	.15	.15			
Dougherty-------------	0-6	2-10	1.45-1.65	2.00-6.00	0.07-0.11	0.0-2.9	0.5-1.0	.20	.20	5	2	134
	6-24	2-10	1.50-1.75	2.00-6.00	0.05-0.11	0.0-2.9	0.0-0.5	.15	.15			
	24-41	18-30	1.40-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-0.5	.32	.32			
	41-52	12-25	1.40-1.70	0.60-6.00	0.07-0.17	0.0-2.9	0.0-0.5	.24	.24			
	52-66	2-15	1.40-1.70	2.00-6.00	0.07-0.15	0.0-2.9	0.0-0.5	.20	.20			
DerB:												
Derby-----------------	0-16	2-8	1.35-1.50	6.00-20.00	0.07-0.11	0.0-2.9	0.5-1.0	.15	.15	5	2	134
	16-28	1-10	1.50-1.70	6.00-20.00	0.05-0.11	0.0-2.9	0.0-0.5	.15	.15			
	28-56	1-10	1.50-1.70	6.00-20.00	0.05-0.11	0.0-2.9	0.0-0.5	.15	.15			
	56-100	1-10	1.50-1.70	6.00-20.00	0.05-0.11	0.0-2.9	0.0-0.5	.15	.15			
DerE:												
Derby-----------------	0-4	2-8	1.35-1.50	6.00-20.00	0.07-0.11	0.0-2.9	0.5-1.0	.15	.15	5	2	134
	4-17	1-10	1.50-1.70	6.00-20.00	0.05-0.11	0.0-2.9	0.0-0.5	.15	.15			
	17-34	1-10	1.50-1.70	6.00-20.00	0.05-0.11	0.0-2.9	0.0-0.5	.15	.15			
	34-96	1-10	1.50-1.70	6.00-20.00	0.05-0.11	0.0-2.9	0.0-0.5	.15	.15			
DleA:												
Dale------------------	0-9	27-35	1.30-1.60	0.20-0.60	0.15-0.22	3.0-5.9	1.0-3.0	.32	.32	5	4	86
	9-22	27-35	1.30-1.60	0.20-0.60	0.15-0.22	3.0-5.9	1.0-3.0	.32	.32			
	22-31	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	1.0-2.0	.37	.37			
	31-39	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	1.0-2.0	.37	.37			
	39-66	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.37	.37			
	66-96	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.37	.37			
DSRG:												
Darsil----------------	0-6	1-10	1.45-1.65	6.00-20.00	0.07-0.11	0.0-2.9	0.5-3.0	.17	.17	2	2	134
	6-10	1-10	1.50-1.75	6.00-20.00	0.04-0.11	0.0-2.9	0.0-0.5	.17	.17			
	10-15	---	1.85-2.00	0.20-2.00	---	---	---	---	---			
Stephenville----------	0-4	10-20	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	3	3	86
	4-5	5-15	1.40-1.70	2.00-20.00	0.07-0.19	0.0-2.9	0.0-0.5	.20	.20			
	5-14	18-35	1.35-1.75	0.60-2.00	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	14-22	18-35	1.35-1.75	0.60-2.00	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	22-30	---	1.85-2.00	0.20-0.60	---	---	---	---	---			
Rock outcrop----------	0-60	---	1.85-2.00	0.06-2.00	---	---	---	---	---	---	8	0
DUDE:												
Derby-----------------	0-6	2-8	1.35-1.50	6.00-20.00	0.07-0.11	0.0-2.9	0.5-1.0	.15	.15	5	2	134
	6-23	1-10	1.50-1.70	6.00-20.00	0.05-0.11	0.0-2.9	0.0-0.5	.15	.15			
	23-32	1-10	1.50-1.70	6.00-20.00	0.05-0.11	0.0-2.9	0.0-0.5	.15	.15			
	32-84	1-10	1.50-1.70	6.00-20.00	0.05-0.11	0.0-2.9	0.0-0.5	.15	.15			
Urban land------------	0-60	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
DUDE:												
Dougherty-------------	0-5	2-10	1.45-1.65	2.00-6.00	0.07-0.11	0.0-2.9	0.5-1.0	.20	.20	5	2	134
	5-26	2-10	1.50-1.75	2.00-6.00	0.05-0.11	0.0-2.9	0.0-0.5	.15	.15			
	26-45	18-30	1.40-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-0.5	.32	.32			
	45-63	12-25	1.40-1.70	0.60-6.00	0.07-0.17	0.0-2.9	0.0-0.5	.24	.24			
	63-84	2-15	1.40-1.70	2.00-6.00	0.07-0.15	0.0-2.9	0.0-0.5	.20	.20			
EasA:												
Easpur----------------	0-10	12-26	1.30-1.55	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	10-24	18-35	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.5-1.0	.37	.37			
	24-28	18-35	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.5-1.0	.37	.37			
	28-60	18-35	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32			
	60-80	18-35	1.40-1.70	0.60-2.00	0.15-0.24	0.0-2.9	0.5-1.0	.37	.37			
GaGA:												
Gaddy-----------------	0-7	5-15	1.35-1.50	6.00-20.00	0.07-0.11	0.0-2.9	0.0-0.5	.17	.17	5	2	134
	7-19	5-35	1.50-1.70	6.00-20.00	0.06-0.10	0.0-2.9	0.5-1.0	.17	.17			
	19-79	5-35	1.50-1.70	6.00-20.00	0.06-0.10	0.0-2.9	0.5-1.0	.17	.17			
Gracemore-------------	0-8	2-10	1.35-1.50	6.00-20.00	0.07-0.11	0.0-2.9	0.5-1.0	.17	.17	5	2	134
	8-11	2-10	1.50-1.70	2.00-20.00	0.02-0.11	0.0-2.9	0.0-0.5	.17	.17			
	11-30	2-10	1.50-1.70	2.00-20.00	0.02-0.11	0.0-2.9	0.0-0.5	.17	.17			
	30-65	2-10	1.50-1.70	2.00-20.00	0.02-0.11	0.0-2.9	0.0-0.5	.17	.17			
	65-80	2-10	1.50-1.70	2.00-20.00	0.02-0.11	0.0-2.9	0.0-0.5	.17	.17			
GcmA:												
Gracemont-------------	0-6	40-60	1.25-1.45	0.00-0.06	0.12-0.18	6.0-8.9	1.0-3.0	.37	.37	5	4	86
	6-9	40-60	1.25-1.45	0.00-0.06	0.12-0.18	6.0-8.9	1.0-3.0	.37	.37			
	9-15	10-18	1.40-1.70	0.60-6.00	0.11-0.20	0.0-2.9	0.0-0.5	.37	.37			
	15-26	10-18	1.40-1.70	0.60-6.00	0.11-0.20	0.0-2.9	0.0-0.5	.37	.37			
	26-79	2-15	1.40-1.70	0.60-20.00	0.02-0.20	0.0-2.9	0.0-0.5	.37	.37			
GmtA:												
Gracemont-------------	0-9	10-18	1.30-1.60	0.60-6.00	0.11-0.15	0.0-2.9	0.5-1.0	.20	.20	5	3	86
	9-12	10-18	1.30-1.60	0.60-6.00	0.11-0.15	0.0-2.9	0.5-1.0	.20	.20			
	12-21	10-18	1.45-1.65	0.60-6.00	0.11-0.20	0.0-2.9	0.0-0.5	.32	.32			
	21-36	10-18	1.45-1.65	0.60-6.00	0.11-0.20	0.0-2.9	0.0-0.5	.32	.32			
	36-79	2-15	1.40-1.70	0.60-20.00	0.02-0.20	0.0-2.9	0.0-0.5	.37	.37			
GraC:												
Grainola--------------	0-8	27-35	1.30-1.55	0.20-0.60	0.15-0.22	3.0-5.9	0.5-1.0	.37	.37	3	7	38
	8-18	35-60	1.30-1.70	0.06-0.20	0.10-0.20	6.0-8.9	0.0-0.5	.37	.37			
	18-30	35-60	1.30-1.70	0.06-0.20	0.12-0.20	6.0-8.9	0.0-0.5	.37	.37			
	30-39	35-60	1.30-1.70	0.06-0.20	0.12-0.20	6.0-8.9	0.0-0.5	.37	.37			
	39-45	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
GrAD:												
Grainola--------------	0-4	27-35	1.30-1.55	0.20-0.60	0.15-0.22	3.0-5.9	0.5-1.0	.37	.37	3	7	38
	4-6	35-60	1.30-1.70	0.06-0.20	0.10-0.20	6.0-8.9	0.0-0.5	.37	.37			
	6-18	35-60	1.30-1.70	0.06-0.20	0.12-0.20	6.0-8.9	0.0-0.5	.37	.37			
	18-34	35-60	1.30-1.70	0.06-0.20	0.12-0.20	6.0-8.9	0.0-0.5	.37	.37			
	34-40	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
Ashport---------------	0-9	27-35	1.30-1.60	0.60-2.00	0.15-0.22	3.0-5.9	1.0-3.0	.32	.32	5	7	38
	9-14	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
	14-32	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
	32-55	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
	55-79	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
GrHC:												
Grant	0-11	15-26	1.30-1.50	0.60-2.00	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	4	5	56
	11-17	15-26	1.30-1.55	0.60-2.00	0.13-0.20	0.0-2.9	1.0-3.0	.37	.37			
	17-28	18-35	1.40-1.70	0.60-2.00	0.15-0.20	0.0-2.9	0.5-1.0	.37	.37			
	28-38	18-35	1.40-1.70	0.60-2.00	0.15-0.20	0.0-2.9	0.5-1.0	.37	.37			
	38-45	18-35	1.40-1.70	0.60-2.00	0.15-0.20	0.0-2.9	0.5-1.0	.37	.37			
	45-52	---	1.85-2.00	0.00-0.06	---	---	---	---	---			
Huska	0-6	12-26	1.30-1.55	0.60-2.00	0.10-0.20	0.0-2.9	1.0-3.0	.49	.49	2	5	56
	6-12	35-45	1.50-1.70	0.00-0.06	0.06-0.10	6.0-8.9	0.0-1.0	.43	.43			
	12-29	35-60	1.50-1.70	0.00-0.06	0.06-0.10	6.0-8.9	0.0-1.0	.43	.43			
	29-42	35-60	1.50-1.70	0.00-0.06	0.06-0.10	6.0-8.9	0.0-1.0	.43	.43			
	42-44	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
GrIE:												
Grainola	0-7	27-35	1.30-1.55	0.20-0.60	0.15-0.22	3.0-5.9	0.5-1.0	.37	.37	3	7	38
	7-12	35-60	1.30-1.70	0.06-0.20	0.10-0.20	6.0-8.9	0.0-0.5	.37	.37			
	12-27	35-60	1.30-1.70	0.06-0.20	0.12-0.20	6.0-8.9	0.0-0.5	.37	.37			
	27-38	35-60	1.30-1.70	0.06-0.20	0.12-0.20	6.0-8.9	0.0-0.5	.37	.37			
	38-46	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
Ironmound	0-7	10-18	1.30-1.60	2.00-6.00	0.11-0.15	0.0-2.9	1.0-3.0	.20	.20	2	3	86
	7-18	10-27	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.0-0.5	.32	.32			
	18-22	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
GrPB2:												
Grainola	0-4	15-26	1.25-1.55	0.60-2.00	0.15-0.24	0.0-2.9	0.5-1.0	.43	.43	3	5	56
	4-19	35-60	1.30-1.70	0.06-0.20	0.10-0.20	6.0-8.9	0.0-0.5	.37	.37			
	19-32	35-60	1.30-1.70	0.06-0.20	0.12-0.20	6.0-8.9	0.0-0.5	.37	.37			
	32-39	35-60	1.30-1.70	0.06-0.20	0.12-0.20	6.0-8.9	0.0-0.5	.37	.37			
	39-45	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
Piedmont	0-7	20-26	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.49	.49	3	6	48
	7-16	35-55	1.35-1.70	0.00-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	16-33	35-55	1.35-1.70	0.00-0.06	0.06-0.18	6.0-8.9	0.5-1.0	.37	.37			
	33-39	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
GrPC2:												
Grainola	0-4	27-35	1.30-1.55	0.20-0.60	0.15-0.22	3.0-5.9	0.5-1.0	.37	.37	3	7	38
	4-12	35-60	1.30-1.70	0.06-0.20	0.10-0.20	6.0-8.9	0.0-0.5	.37	.37			
	12-24	35-60	1.30-1.70	0.06-0.20	0.12-0.20	6.0-8.9	0.0-0.5	.37	.37			
	24-30	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
Piedmont	0-7	27-35	1.30-1.60	0.20-0.60	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43	3	6	48
	7-15	35-55	1.35-1.70	0.00-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	15-23	35-55	1.35-1.70	0.00-0.06	0.06-0.18	6.0-8.9	0.5-1.0	.37	.37			
	23-30	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
GUIE:												
Grainola	0-4	27-35	1.30-1.55	0.20-0.60	0.15-0.22	3.0-5.9	0.5-1.0	.37	.37	3	7	38
	4-16	35-60	1.30-1.70	0.06-0.20	0.12-0.20	6.0-8.9	0.0-0.5	.37	.37			
	16-28	35-60	1.30-1.70	0.06-0.20	0.12-0.20	6.0-8.9	0.0-0.5	.37	.37			
	28-36	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
Urban land	0-60	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
Ironmound	0-5	15-25	1.30-1.55	0.60-2.00	0.15-0.20	0.0-2.9	1.0-3.0	.32	.32	2	5	56
	5-12	10-27	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.0-0.5	.32	.32			
	12-18	---	1.85-2.00	0.00-0.20	---	---	---	---	---			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
HarC:												
Harrah----------------	0-6	10-18	1.30-1.60	2.00-6.00	0.11-0.15	0.0-2.9	0.5-2.0	.24	.24	5	3	86
	6-13	5-18	1.30-1.60	2.00-6.00	0.07-0.15	0.0-2.9	0.5-2.0	.20	.20			
	13-19	5-18	1.30-1.60	2.00-6.00	0.07-0.15	0.0-2.9	0.5-2.0	.20	.20			
	19-33	18-35	1.40-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	33-44	18-35	1.40-1.70	0.60-2.00	0.10-0.17	0.0-2.9	0.0-1.0	.32	.32			
	44-84	18-35	1.40-1.70	0.60-2.00	0.10-0.17	0.0-2.9	0.0-1.0	.32	.32			
HarC2:												
Harrah----------------	0-6	10-18	1.30-1.60	2.00-6.00	0.11-0.15	0.0-2.9	0.5-2.0	.24	.24	5	3	86
	6-15	18-35	1.40-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	15-27	18-35	1.40-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	27-37	18-35	1.40-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	37-47	18-35	1.40-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	47-76	18-35	1.40-1.70	0.60-2.00	0.10-0.17	0.0-2.9	0.0-1.0	.32	.32			
HarC4:												
Harrah----------------	0-5	10-18	1.30-1.60	2.00-6.00	0.11-0.15	0.0-2.9	0.5-2.0	.24	.24	4	3	86
	5-8	5-18	1.30-1.60	2.00-6.00	0.07-0.15	0.0-2.9	0.5-2.0	.20	.20			
	8-11	18-35	1.40-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	11-38	18-35	1.40-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	38-65	18-35	1.40-1.70	0.60-2.00	0.10-0.17	0.0-2.9	0.0-1.0	.32	.32			
	65-80	18-35	1.40-1.70	0.60-2.00	0.10-0.17	0.0-2.9	0.0-1.0	.32	.32			
HarG:												
Harrah----------------	0-8	10-18	1.30-1.60	2.00-6.00	0.11-0.15	0.0-2.9	0.5-2.0	.24	.24	5	3	86
	8-13	5-18	1.30-1.60	2.00-6.00	0.07-0.15	0.0-2.9	0.5-2.0	.20	.20			
	13-25	18-35	1.40-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	25-35	18-35	1.40-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	35-43	18-35	1.40-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	43-84	18-35	1.40-1.70	0.60-2.00	0.10-0.17	0.0-2.9	0.0-1.0	.32	.32			
HaUC:												
Harrah----------------	0-6	10-18	1.30-1.60	2.00-6.00	0.11-0.15	0.0-2.9	0.5-2.0	.24	.24	5	3	86
	6-8	5-18	1.30-1.60	2.00-6.00	0.07-0.15	0.0-2.9	0.5-2.0	.20	.20			
	8-18	18-35	1.40-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	18-37	18-35	1.40-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	37-52	18-35	1.40-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	52-84	18-35	1.40-1.70	0.60-2.00	0.10-0.17	0.0-2.9	0.0-1.0	.32	.32			
Urban land------------	0-60	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
HiLA:												
Hibsaw----------------	0-8	18-27	1.30-1.60	0.60-2.00	0.04-0.20	0.0-3.0	0.5-2.0	.37	.37	5	6	48
	8-18	18-34	1.40-1.70	0.20-2.00	0.05-0.24	3.0-5.9	0.0-1.0	.37	.37			
	18-30	27-34	1.45-1.70	0.06-0.60	0.05-0.22	3.0-5.9	0.0-1.0	.37	.37			
	30-74	10-40	1.40-1.70	0.06-6.00	0.07-0.22	3.0-5.9	0.0-1.0	.37	.37			
	74-96	18-34	1.40-1.70	0.20-2.00	0.10-0.24	3.0-5.9	0.0-0.5	.37	.37			
Lomill----------------	0-7	27-39	1.30-1.60	0.20-0.60	0.18-0.22	3.0-5.9	1.0-3.0	.43	.43	5	7	38
	7-25	35-60	1.35-1.65	0.00-0.06	0.10-0.20	6.0-8.9	0.5-1.0	.37	.37			
	25-31	35-60	1.35-1.65	0.00-0.06	0.10-0.20	6.0-8.9	0.5-1.0	.37	.37			
	31-84	10-34	1.40-1.70	2.00-6.00	0.07-0.17	0.0-2.9	0.5-1.0	.28	.28			
IrCE:												
Ironmound-------------	0-8	10-18	1.30-1.60	2.00-6.00	0.11-0.15	0.0-2.9	1.0-3.0	.20	.20	2	3	86
	8-14	10-27	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.0-0.5	.32	.32			
	14-20	---	1.85-2.00	0.00-0.20	---	---	---	---	---			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
IrCE:												
Coyle-----------------	0-9	15-26	1.30-1.55	0.60-2.00	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	3	6	48
	9-12	18-26	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.5-2.0	.37	.37			
	12-23	20-35	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32			
	23-27	18-35	1.40-1.70	0.60-2.00	0.07-0.20	0.0-2.9	0.0-0.5	.28	.32			
	27-30	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
IrKD:												
Ironmound-------------	0-3	15-25	1.30-1.55	0.60-2.00	0.15-0.20	0.0-2.9	1.0-3.0	.32	.32	2	5	56
	3-13	10-27	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.0-0.5	.32	.32			
	13-21	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
Kingfisher------------	0-10	15-27	1.30-1.55	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.37	.37	3	5	56
	10-21	27-35	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	0.0-0.5	.32	.32			
	21-38	27-40	1.45-1.70	0.20-0.60	0.14-0.22	3.0-5.9	0.0-0.5	.32	.32			
	38-49	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
KekA:												
Keokuk----------------	0-8	10-18	1.30-1.55	0.60-2.00	0.13-0.20	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	8-12	10-18	1.30-1.55	0.60-2.00	0.13-0.20	0.0-2.9	1.0-3.0	.37	.37			
	12-20	10-18	1.30-1.60	0.60-2.00	0.13-0.24	0.0-2.9	0.5-1.0	.37	.37			
	20-84	5-18	1.30-1.60	0.60-2.00	0.10-0.20	0.0-2.9	0.5-1.0	.37	.37			
KeoA:												
Keokuk----------------	0-11	10-18	1.30-1.55	0.60-2.00	0.13-0.20	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	11-25	10-18	1.30-1.60	0.60-2.00	0.13-0.24	0.0-2.9	0.5-1.0	.37	.37			
	25-96	5-18	1.30-1.60	0.60-2.00	0.10-0.20	0.0-2.9	0.5-1.0	.37	.37			
KeUA:												
Keokuk----------------	0-16	10-18	1.30-1.55	0.60-2.00	0.13-0.20	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	16-42	10-18	1.30-1.60	0.60-2.00	0.13-0.24	0.0-2.9	0.5-1.0	.37	.37			
	42-80	5-18	1.30-1.60	0.60-2.00	0.10-0.20	0.0-2.9	0.5-1.0	.37	.37			
Urban land------------	0-60	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
KgIC:												
Kingfisher------------	0-11	15-27	1.30-1.55	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.37	.37	3	5	56
	11-13	25-35	1.40-1.70	0.20-0.60	0.15-0.24	3.0-5.9	0.0-1.0	.37	.37			
	13-25	27-35	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	0.0-0.5	.32	.32			
	25-28	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
Ironmound-------------	0-6	15-25	1.30-1.55	0.60-2.00	0.15-0.20	0.0-2.9	1.0-3.0	.32	.32	2	5	56
	6-14	10-27	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.0-0.5	.32	.32			
	14-18	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
KowB:												
Konawa----------------	0-5	8-18	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	5	3	86
	5-17	2-15	1.40-1.75	0.60-2.00	0.05-0.19	0.0-2.9	0.3-1.0	.32	.32			
	17-34	18-30	1.45-1.70	0.60-6.00	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24			
	34-58	18-30	1.45-1.70	0.60-6.00	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24			
	58-84	7-30	1.40-1.70	2.00-6.00	0.07-0.19	0.0-2.9	0.1-0.7	.20	.20			
KowD:												
Konawa----------------	0-8	8-18	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	5	3	86
	8-11	2-15	1.40-1.75	0.60-2.00	0.05-0.19	0.0-2.9	0.3-1.0	.32	.32			
	11-28	18-30	1.45-1.70	0.60-6.00	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24			
	28-38	18-30	1.45-1.70	0.60-6.00	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24			
	38-52	18-30	1.45-1.70	0.60-6.00	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24			
	52-80	7-30	1.40-1.70	2.00-6.00	0.07-0.19	0.0-2.9	0.1-0.7	.20	.20			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
KowD2:												
Konawa----------------	0-7	8-18	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	5	3	86
	7-18	18-30	1.45-1.70	0.60-6.00	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24			
	18-37	18-30	1.45-1.70	0.60-6.00	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24			
	37-80	7-30	1.40-1.70	2.00-6.00	0.07-0.19	0.0-2.9	0.1-0.7	.20	.20			
KowD4:												
Konawa----------------	0-10	8-18	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	4	3	86
	10-13	2-15	1.40-1.75	0.60-2.00	0.05-0.19	0.0-2.9	0.3-1.0	.32	.32			
	13-35	18-30	1.45-1.70	0.60-6.00	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24			
	35-53	18-30	1.45-1.70	0.60-6.00	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24			
	53-65	18-30	1.45-1.70	0.60-6.00	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24			
	65-80	18-30	1.45-1.70	0.60-6.00	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24			
KrdA:												
Kirkland--------------	0-10	13-26	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.49	.49	5	5	56
	10-22	40-60	1.35-1.60	0.00-0.06	0.10-0.14	6.0-8.9	1.0-2.0	.37	.37			
	22-37	40-60	1.35-1.60	0.00-0.06	0.10-0.14	6.0-8.9	1.0-2.0	.37	.37			
	37-63	40-60	1.35-1.60	0.00-0.06	0.10-0.14	6.0-8.9	1.0-2.0	.37	.37			
	63-82	35-60	1.30-1.65	0.00-0.06	0.10-0.18	9.0-25.0	0.5-1.0	.32	.32			
KrUA:												
Kirkland--------------	0-11	13-26	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.49	.49	5	5	56
	11-28	40-60	1.35-1.60	0.00-0.06	0.10-0.14	6.0-8.9	1.0-2.0	.37	.37			
	28-48	35-60	1.30-1.65	0.00-0.06	0.10-0.18	9.0-25.0	0.5-1.0	.32	.32			
	48-76	35-60	1.30-1.65	0.00-0.06	0.10-0.18	9.0-25.0	0.5-1.0	.32	.32			
	76-84	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
Urban land------------	0-60	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
KUIC:												
Kingfisher------------	0-11	15-27	1.30-1.55	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.37	.37	3	5	56
	11-13	25-35	1.40-1.70	0.20-0.60	0.15-0.24	3.0-5.9	0.0-1.0	.37	.37			
	13-25	27-35	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	0.0-0.5	.32	.32			
	25-28	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
Urban land------------	0-60	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
Ironmound-------------	0-6	15-25	1.30-1.55	0.60-2.00	0.15-0.20	0.0-2.9	1.0-3.0	.32	.32	2	5	56
	6-14	10-27	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.0-0.5	.32	.32			
	14-18	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
KwUD:												
Konawa----------------	0-7	8-18	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	5	3	86
	7-10	2-15	1.40-1.75	0.60-2.00	0.05-0.19	0.0-2.9	0.3-1.0	.32	.32			
	10-25	18-30	1.45-1.70	0.60-6.00	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24			
	25-49	18-30	1.45-1.70	0.60-6.00	0.13-0.19	0.0-2.9	0.1-0.7	.24	.24			
	49-80	7-30	1.40-1.70	2.00-6.00	0.07-0.19	0.0-2.9	0.1-0.7	.20	.20			
Urban land------------	0-60	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
LarA:												
Lawrie----------------	0-9	15-26	1.25-1.55	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	9-24	15-26	1.25-1.55	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37			
	24-40	18-35	1.30-1.75	0.60-2.00	0.16-0.24	3.0-5.9	1.0-3.0	.37	.37			
	40-67	18-35	1.30-1.75	0.60-2.00	0.16-0.24	3.0-5.9	1.0-3.0	.37	.37			
	67-87	18-35	1.30-1.75	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.37	.37			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
LatG:												
Latrass---------------	0-5	15-26	1.30-1.65	0.60-2.00	0.15-0.20	0.0-2.9	0.0-3.0	.49	.49	1	5	56
	5-22	35-60	1.30-1.85	0.00-0.06	0.08-0.19	6.0-8.9	0.0-1.0	.37	.37			
	22-42	35-60	1.30-1.85	0.00-0.06	0.08-0.19	6.0-8.9	0.0-1.0	.37	.37			
	42-80	---	1.00-2.35	0.06-20.00	---	---	---	---	---			
LawA:												
Lawrie----------------	0-9	15-26	1.25-1.55	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	9-13	15-26	1.25-1.55	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37			
	13-18	18-35	1.30-1.75	0.60-2.00	0.16-0.24	3.0-5.9	1.0-3.0	.37	.37			
	18-47	18-35	1.30-1.75	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.37	.37			
	47-59	18-35	1.30-1.75	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.37	.37			
	59-82	18-40	1.45-1.70	0.60-2.00	0.15-0.22	3.0-5.9	0.0-1.0	.37	.37			
LitB:												
Littleaxe-------------	0-5	8-18	1.30-1.60	2.00-6.00	0.11-0.15	0.0-2.9	0.5-2.0	.24	.24	4	3	86
	5-9	3-18	1.30-1.60	2.00-6.00	0.07-0.15	0.0-2.9	0.0-0.5	.20	.20			
	9-17	18-35	1.50-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	17-36	18-35	1.50-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	36-43	14-30	1.50-1.70	0.60-6.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	43-45	---	1.85-2.00	0.20-2.00	---	---	---	---	---			
LitC:												
Littleaxe-------------	0-6	8-18	1.30-1.60	2.00-6.00	0.11-0.15	0.0-2.9	0.5-2.0	.24	.24	4	3	86
	6-8	3-18	1.30-1.60	2.00-6.00	0.07-0.15	0.0-2.9	0.0-0.5	.20	.20			
	8-33	18-35	1.50-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	33-52	18-35	1.50-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	52-59	14-30	1.50-1.70	0.60-6.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	59-72	---	1.85-2.00	0.20-2.00	---	---	---	---	---			
LitC2:												
Littleaxe-------------	0-9	8-18	1.30-1.60	2.00-6.00	0.11-0.15	0.0-2.9	0.5-2.0	.24	.24	4	3	86
	9-21	18-35	1.50-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	21-32	18-35	1.50-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	32-45	14-30	1.50-1.70	0.60-6.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	45-50	---	1.85-2.00	0.20-2.00	---	---	---	---	---			
LomA:												
Lomill----------------	0-4	27-39	1.30-1.60	0.20-0.60	0.18-0.22	3.0-5.9	1.0-3.0	.43	.43	5	7	38
	4-12	35-60	1.35-1.65	0.00-0.06	0.10-0.20	6.0-8.9	0.5-1.0	.37	.37			
	12-27	35-60	1.35-1.65	0.00-0.06	0.10-0.20	6.0-8.9	0.5-1.0	.37	.37			
	27-48	10-34	1.40-1.70	2.00-6.00	0.07-0.17	0.0-2.9	0.5-1.0	.28	.28			
	48-72	10-34	1.40-1.70	2.00-6.00	0.07-0.17	0.0-2.9	0.5-1.0	.28	.28			
LtUC:												
Littleaxe-------------	0-6	8-18	1.30-1.60	2.00-6.00	0.11-0.15	0.0-2.9	0.5-2.0	.24	.24	4	3	86
	6-11	3-18	1.30-1.60	2.00-6.00	0.07-0.15	0.0-2.9	0.0-0.5	.20	.20			
	11-25	18-35	1.50-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	25-32	18-35	1.50-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	32-44	14-30	1.50-1.70	0.60-6.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	44-50	---	1.85-2.00	0.20-2.00	---	---	---	---	---			
Urban land------------	0-60	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
LweA:												
Lawrie----------------	0-11	27-40	1.30-1.50	0.60-2.00	0.18-0.22	3.0-5.9	1.0-3.0	.32	.32	5	7	38
	11-21	18-35	1.30-1.75	0.60-2.00	0.16-0.24	3.0-5.9	1.0-3.0	.37	.37			
	21-34	18-35	1.30-1.75	0.60-2.00	0.16-0.24	3.0-5.9	1.0-3.0	.37	.37			
	34-55	18-35	1.30-1.75	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.37	.37			
	55-80	18-35	1.30-1.75	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.37	.37			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
LwfA:												
Lawrie----------------	0-14	10-18	1.30-1.60	2.00-6.00	0.11-0.15	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	14-33	18-35	1.30-1.75	0.60-2.00	0.16-0.24	3.0-5.9	1.0-3.0	.37	.37			
	33-57	18-35	1.30-1.75	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.37	.37			
	57-70	18-35	1.30-1.75	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.37	.37			
	70-96	18-40	1.30-1.75	0.60-2.00	0.15-0.22	3.0-5.9	0.0-1.0	.37	.37			
LwUA:												
Lawrie----------------	0-9	15-26	1.25-1.55	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	9-17	18-35	1.30-1.75	0.60-2.00	0.16-0.24	3.0-5.9	1.0-3.0	.37	.37			
	17-24	18-35	1.30-1.75	0.60-2.00	0.16-0.24	3.0-5.9	1.0-3.0	.37	.37			
	24-33	18-35	1.30-1.75	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.37	.37			
	33-45	18-35	1.30-1.75	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.37	.37			
	45-84	18-40	1.30-1.75	0.60-2.00	0.15-0.22	3.0-5.9	0.0-1.0	.37	.37			
Urban land------------	0-60	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
MlfA:												
Miller----------------	0-19	10-18	1.30-1.60	2.00-6.00	0.13-0.19	0.0-2.9	0.0-1.0	.37	.37	5	3	86
	19-29	40-50	1.25-1.45	0.00-0.06	0.12-0.18	6.0-8.9	1.0-3.0	.37	.37			
	29-37	40-60	1.35-1.65	0.00-0.06	0.12-0.19	6.0-8.9	0.5-2.0	.37	.37			
	37-96	35-60	1.35-1.65	0.06-0.20	0.12-0.19	6.0-8.9	0.5-1.0	.37	.37			
MllA:												
Miller----------------	0-7	40-50	1.25-1.45	0.00-0.06	0.12-0.18	6.0-8.9	1.0-3.0	.37	.37	5	4	86
	7-12	40-50	1.25-1.45	0.00-0.06	0.12-0.18	6.0-8.9	1.0-3.0	.37	.37			
	12-24	35-60	1.35-1.65	0.00-0.06	0.12-0.19	6.0-8.9	0.5-2.0	.37	.37			
	24-70	35-60	1.35-1.65	0.06-0.20	0.12-0.19	6.0-8.9	0.5-1.0	.37	.37			
	70-84	25-50	1.35-1.65	0.06-0.20	0.12-0.19	6.0-8.9	0.5-1.0	.37	.37			
M-W:												
Miscellaneous water.												
NewB:												
Newalla---------------	0-4	7-17	1.40-1.65	0.60-2.00	0.13-0.19	0.0-2.9	0.5-3.0	.37	.37	4	3	86
	4-8	7-17	1.40-1.65	0.60-2.00	0.13-0.19	0.0-2.9	0.5-3.0	.37	.37			
	8-16	20-35	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.43	.43			
	16-32	40-60	1.30-1.60	0.00-0.06	0.12-0.18	6.0-8.9	0.0-0.5	.37	.37			
	32-42	40-60	1.30-1.65	0.00-0.06	0.04-0.18	6.0-8.9	0.0-0.5	.37	.37			
	42-48	---	1.85-2.00	0.00-0.06	---	---	---	---	---			
NewC2:												
Newalla---------------	0-6	7-17	1.40-1.65	0.60-2.00	0.13-0.19	0.0-2.9	0.5-3.0	.37	.37	4	3	86
	6-10	20-35	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.43	.43			
	10-38	40-60	1.30-1.60	0.00-0.06	0.12-0.18	6.0-8.9	0.0-0.5	.37	.37			
	38-55	40-60	1.30-1.60	0.00-0.06	0.12-0.18	6.0-8.9	0.0-0.5	.37	.37			
	55-60	---	1.85-2.00	0.00-0.06	---	---	---	---	---			
NorB:												
Norge-----------------	0-12	15-26	1.30-1.50	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	12-18	18-35	1.40-1.70	0.20-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.32	.32			
	18-27	27-35	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	0.5-1.0	.32	.32			
	27-43	27-35	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	0.5-1.0	.32	.32			
	43-86	27-50	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	0.5-1.0	.32	.32			
NorC:												
Norge-----------------	0-9	15-26	1.30-1.50	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	9-14	18-35	1.40-1.70	0.20-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.32	.32			
	14-39	27-35	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	0.5-1.0	.32	.32			
	39-68	27-35	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	0.5-1.0	.32	.32			
	68-88	27-50	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	0.5-1.0	.32	.32			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
NorC2:												
Norge	0-10	15-26	1.30-1.50	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	10-30	27-35	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	0.5-1.0	.32	.32			
	30-49	27-35	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	0.5-1.0	.32	.32			
	49-63	27-35	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	0.5-1.0	.32	.32			
	63-84	27-50	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	0.5-1.0	.32	.32			
NoUC:												
Norge	0-9	15-26	1.30-1.50	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	9-16	18-35	1.40-1.70	0.20-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.32	.32			
	16-46	18-35	1.40-1.70	0.20-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.32	.32			
	46-68	27-35	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	0.5-1.0	.32	.32			
	68-84	27-50	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	0.5-1.0	.32	.32			
Urban land	0-60	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
PdHC:												
Piedmont	0-7	20-26	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.49	.49	3	6	48
	7-10	27-40	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43			
	10-15	35-55	1.35-1.70	0.00-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	15-25	35-55	1.35-1.70	0.00-0.06	0.06-0.18	6.0-8.9	0.5-1.0	.37	.37			
	25-37	35-55	1.35-1.70	0.00-0.06	0.06-0.18	6.0-8.9	0.5-1.0	.37	.37			
	37-45	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
Huska	0-3	12-26	1.30-1.55	0.60-2.00	0.10-0.20	0.0-2.9	1.0-3.0	.49	.49	2	5	56
	3-18	35-45	1.50-1.70	0.00-0.06	0.06-0.10	6.0-8.9	0.0-1.0	.43	.43			
	18-40	35-60	1.50-1.70	0.00-0.06	0.06-0.10	6.0-8.9	0.0-1.0	.43	.43			
	40-45	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
PieC2:												
Piedmont	0-4	27-35	1.30-1.60	0.20-0.60	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43	3	6	48
	4-20	35-55	1.35-1.70	0.00-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	20-32	35-55	1.35-1.70	0.00-0.06	0.06-0.18	6.0-8.9	0.5-1.0	.37	.37			
	32-40	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
PimB:												
Piedmont	0-4	20-26	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.49	.49	3	6	48
	4-8	32-40	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43			
	8-16	35-55	1.35-1.70	0.00-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	16-30	35-55	1.35-1.70	0.00-0.06	0.06-0.18	6.0-8.9	0.5-1.0	.37	.37			
	30-36	35-55	1.35-1.70	0.00-0.06	0.06-0.18	6.0-8.9	0.5-1.0	.37	.37			
	36-48	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
PimC:												
Piedmont	0-4	20-26	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.49	.49	3	6	48
	4-6	32-40	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43			
	6-23	35-55	1.35-1.70	0.00-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	23-31	35-55	1.35-1.70	0.00-0.06	0.06-0.18	6.0-8.9	0.5-1.0	.37	.37			
	31-40	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
PIT:												
Pits	0-60	---	1.35-1.70	0.06-6.00	---	---	---	---	---	---	8	0
PukA:												
Pulaski	0-9	10-18	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.20	.20	5	3	86
	9-14	10-18	1.30-1.70	2.00-6.00	0.13-0.19	0.0-2.9	0.0-1.0	.32	.32			
	14-55	10-18	1.30-1.70	2.00-6.00	0.13-0.19	0.0-2.9	0.0-1.0	.32	.32			
	55-79	5-18	1.30-1.70	2.00-6.00	0.07-0.20	0.0-2.9	0.0-1.0	.32	.32			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
PulA:												
Pulaski---------------	0-5	10-18	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.20	.20	5	3	86
	5-17	10-18	1.30-1.70	2.00-6.00	0.13-0.19	0.0-2.9	0.0-1.0	.32	.32			
	17-34	10-18	1.30-1.70	2.00-6.00	0.13-0.19	0.0-2.9	0.0-1.0	.32	.32			
	34-72	5-18	1.30-1.70	2.00-6.00	0.07-0.20	0.0-2.9	0.0-1.0	.32	.32			
RenB:												
Renfrow---------------	0-8	18-26	1.25-1.55	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.49	.49	5	6	48
	8-15	22-40	1.30-1.75	0.20-0.60	0.15-0.24	3.0-5.9	0.5-2.0	.43	.43			
	15-41	35-55	1.30-1.75	0.00-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	41-68	35-55	1.30-1.75	0.00-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	68-99	35-55	1.30-1.75	0.00-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
RinB:												
Renthin---------------	0-4	20-26	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.49	.49	4	6	48
	4-10	32-40	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43			
	10-29	35-55	1.35-1.70	0.00-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	29-55	35-55	1.30-1.70	0.00-0.06	0.07-0.22	6.0-8.9	0.5-1.0	.37	.37			
	55-77	---	1.85-2.00	0.00-0.06	---	---	---	---	---			
RnnB:												
Renthin---------------	0-10	27-35	1.30-1.60	0.20-0.60	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43	4	6	48
	10-16	32-40	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43			
	16-26	35-55	1.35-1.70	0.00-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	26-34	35-55	1.35-1.70	0.00-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	34-44	35-55	1.30-1.70	0.00-0.06	0.07-0.22	6.0-8.9	0.5-1.0	.37	.37			
	44-50	---	1.85-2.00	0.00-0.06	---	---	---	---	---			
RnnC2:												
Renthin---------------	0-8	27-35	1.30-1.60	0.20-0.60	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43	4	6	48
	8-12	32-40	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43			
	12-19	35-55	1.35-1.70	0.00-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	19-55	35-55	1.30-1.70	0.00-0.06	0.07-0.22	6.0-8.9	0.5-1.0	.37	.37			
	55-60	---	1.85-2.00	0.00-0.06	---	---	---	---	---			
RnUC:												
Renthin---------------	0-10	20-26	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.49	.49	4	6	48
	10-14	32-40	1.45-1.70	0.20-0.60	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43			
	14-51	35-55	1.35-1.70	0.00-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	51-58	35-55	1.30-1.70	0.00-0.06	0.07-0.22	6.0-8.9	0.5-1.0	.37	.37			
	58-72	---	1.85-2.00	0.00-0.06	---	---	---	---	---			
Urban land------------	0-60	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
SDGD4:												
Stephenville----------	0-4	10-20	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	2	3	86
	4-20	18-35	1.35-1.75	0.60-2.00	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	20-30	18-35	1.35-1.75	0.60-2.00	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	30-40	---	1.85-2.00	0.20-0.60	---	---	---	---	---			
Darsil----------------	0-6	1-10	1.45-1.65	6.00-20.00	0.07-0.11	0.0-2.9	0.5-3.0	.17	.17	1	2	134
	6-10	1-10	1.50-1.75	6.00-20.00	0.04-0.11	0.0-2.9	0.0-0.5	.17	.17			
	10-15	---	1.85-2.00	0.20-2.00	---	---	---	---	---			
Gullied land----------	0-60	---	1.30-1.70	0.20-20.00	---	---	---	---	---	---	8	0
SDND:												
Stephenville----------	0-3	10-20	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	3	3	86
	3-10	5-15	1.40-1.70	2.00-20.00	0.07-0.19	0.0-2.9	0.0-0.5	.20	.20			
	10-21	18-35	1.35-1.75	0.60-2.00	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	21-24	---	1.85-2.00	0.20-0.60	---	---	---	---	---			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
SDND:												
Darsil----------------	0-5	1-10	1.45-1.65	6.00-20.00	0.07-0.11	0.0-2.9	0.5-3.0	.17	.17	2	2	134
	5-16	1-10	1.50-1.75	6.00-20.00	0.04-0.11	0.0-2.9	0.0-0.5	.17	.17			
	16-18	---	1.85-2.00	0.20-2.00	---	---	---	---	---			
Newalla---------------	0-3	7-17	1.40-1.65	0.60-2.00	0.13-0.19	0.0-2.9	0.5-3.0	.37	.37	4	3	86
	3-10	7-17	1.40-1.65	0.60-2.00	0.13-0.19	0.0-2.9	0.5-3.0	.37	.37			
	10-15	20-35	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.43	.43			
	15-30	40-60	1.30-1.60	0.00-0.06	0.12-0.18	6.0-8.9	0.0-0.5	.37	.37			
	30-41	40-60	1.30-1.60	0.00-0.06	0.12-0.18	6.0-8.9	0.0-0.5	.37	.37			
	41-45	---	1.85-2.00	0.00-0.06	---	---	---	---	---			
SDND2:												
Stephenville----------	0-4	10-20	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	3	3	86
	4-17	18-35	1.35-1.75	0.60-2.00	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	17-24	18-35	1.35-1.75	0.60-2.00	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	24-29	18-35	1.35-1.75	0.60-2.00	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	29-31	---	1.85-2.00	0.20-0.60	---	---	---	---	---			
Darsil----------------	0-6	1-10	1.45-1.65	6.00-20.00	0.07-0.11	0.0-2.9	0.5-3.0	.17	.17	2	2	134
	6-14	1-10	1.50-1.75	6.00-20.00	0.04-0.11	0.0-2.9	0.0-0.5	.17	.17			
	14-16	---	1.85-2.00	0.20-2.00	---	---	---	---	---			
Newalla---------------	0-6	7-17	1.40-1.65	0.60-2.00	0.13-0.19	0.0-2.9	0.5-3.0	.37	.37	4	3	86
	6-14	20-35	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.43	.43			
	14-44	40-60	1.30-1.60	0.00-0.06	0.12-0.18	6.0-8.9	0.0-0.5	.37	.37			
	44-50	40-60	1.30-1.65	0.00-0.06	0.04-0.18	6.0-8.9	0.0-0.5	.37	.37			
	50-55	---	1.85-2.00	0.00-0.06	---	---	---	---	---			
StDC:												
Stephenville----------	0-5	10-20	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	3	3	86
	5-8	5-15	1.40-1.70	2.00-20.00	0.07-0.19	0.0-2.9	0.0-0.5	.20	.20			
	8-20	18-35	1.35-1.75	0.60-2.00	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	20-27	18-35	1.35-1.75	0.60-2.00	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	27-32	---	1.85-2.00	0.20-0.60	---	---	---	---	---			
Darsil----------------	0-4	1-10	1.45-1.65	6.00-20.00	0.07-0.11	0.0-2.9	0.5-3.0	.17	.17	2	2	134
	4-16	1-10	1.50-1.75	6.00-20.00	0.04-0.11	0.0-2.9	0.0-0.5	.17	.17			
	16-24	---	1.85-2.00	0.20-2.00	---	---	---	---	---			
StDC2:												
Stephenville----------	0-3	10-20	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	3	3	86
	3-6	18-35	1.35-1.75	0.60-2.00	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	6-17	18-35	1.35-1.75	0.60-2.00	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	17-26	18-35	1.35-1.75	0.60-2.00	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	26-42	---	1.85-2.00	0.20-0.60	---	---	---	---	---			
Darsil----------------	0-4	1-10	1.45-1.65	6.00-20.00	0.07-0.11	0.0-2.9	0.5-3.0	.17	.17	2	2	134
	4-15	1-10	1.50-1.75	6.00-20.00	0.04-0.11	0.0-2.9	0.0-0.5	.17	.17			
	15-20	---	1.85-2.00	0.20-2.00	---	---	---	---	---			
StLC4:												
Stephenville----------	0-6	10-20	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	2	3	86
	6-20	18-35	1.35-1.75	0.60-2.00	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	20-30	18-35	1.35-1.75	0.60-2.00	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	30-40	---	1.85-2.00	0.20-0.60	---	---	---	---	---			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
StLC4:												
Littleaxe-------------	0-10	8-18	1.30-1.60	2.00-6.00	0.11-0.15	0.0-2.9	0.5-2.0	.24	.24	3	3	86
	10-24	18-35	1.50-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	24-42	18-35	1.50-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	42-52	14-30	1.50-1.70	0.60-6.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	52-56	---	1.85-2.00	0.20-2.00	---	---	---	---	---			
SUND:												
Stephenville----------	0-5	10-20	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	3	3	86
	5-9	5-15	1.40-1.70	2.00-20.00	0.07-0.19	0.0-2.9	0.0-0.5	.20	.20			
	9-22	18-35	1.35-1.75	0.60-2.00	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	22-28	18-35	1.35-1.75	0.60-2.00	0.13-0.19	0.0-2.9	0.5-1.0	.32	.32			
	28-35	---	1.85-2.00	0.20-0.60	---	---	---	---	---			
Urban land------------	0-60	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
Newalla---------------	0-6	10-25	1.30-1.55	0.60-2.00	0.14-0.20	0.0-2.9	0.5-3.0	.49	.49	4	5	56
	6-11	20-35	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.43	.43			
	11-34	40-60	1.30-1.60	0.00-0.06	0.12-0.18	6.0-8.9	0.0-0.5	.37	.37			
	34-58	40-60	1.30-1.60	0.00-0.06	0.12-0.18	6.0-8.9	0.0-0.5	.37	.37			
	58-72	---	1.85-2.00	0.00-0.06	---	---	---	---	---			
TevD:												
Teval-----------------	0-7	15-26	1.30-1.55	0.60-2.00	0.13-0.19	0.0-2.9	1.0-3.0	.37	.37	4	6	48
	7-11	18-30	1.40-1.70	0.60-2.00	0.13-0.20	0.0-2.9	1.0-3.0	.32	.32			
	11-20	18-34	1.40-1.70	0.60-2.00	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32			
	20-38	18-34	1.40-1.70	0.60-2.00	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32			
	38-50	5-30	1.40-1.70	2.00-20.00	0.03-0.17	0.0-2.9	0.0-1.0	.17	.32			
	50-96	2-20	1.40-1.70	2.00-20.00	0.03-0.17	0.0-2.9	0.0-1.0	.10	.28			
TevD2:												
Teval-----------------	0-5	15-26	1.30-1.55	0.60-2.00	0.13-0.19	0.0-2.9	1.0-3.0	.37	.37	4	6	48
	5-9	18-30	1.40-1.70	0.60-2.00	0.13-0.20	0.0-2.9	1.0-3.0	.32	.32			
	9-21	18-34	1.40-1.70	0.60-2.00	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32			
	21-51	5-30	1.40-1.70	2.00-20.00	0.03-0.17	0.0-2.9	0.0-1.0	.17	.32			
	51-72	2-20	1.40-1.70	2.00-20.00	0.03-0.17	0.0-2.9	0.0-1.0	.10	.28			
TlrB:												
Teller----------------	0-10	10-18	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	10-18	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	18-29	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	29-38	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	38-47	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	47-84	10-20	1.30-1.70	2.00-6.00	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32			
TlrC:												
Teller----------------	0-12	10-18	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	12-17	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	17-33	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	33-46	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	46-57	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	57-79	10-20	1.30-1.70	2.00-6.00	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32			
TlrC2:												
Teller----------------	0-10	10-18	1.40-1.65	2.00-6.00	0.14-0.19	0.0-2.9	1.0-3.0	.32	.32	5	3	86
	10-17	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	17-33	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	33-50	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	50-74	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	74-84	10-20	1.30-1.70	2.00-6.00	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
TlrD:												
Teller	0-12	10-18	1.40-1.65	2.00-6.00	0.14-0.19	0.0-2.9	1.0-3.0	.32	.32	5	3	86
	12-17	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	17-30	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	30-48	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	48-60	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	60-79	10-20	1.30-1.70	2.00-6.00	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32			
TlUD:												
Teller	0-11	10-18	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	11-17	10-20	1.30-1.70	2.00-6.00	0.13-0.20	0.0-2.9	1.0-3.0	.32	.32			
	17-27	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	27-43	18-30	1.30-1.70	0.60-2.00	0.14-0.20	0.0-2.9	0.5-1.0	.32	.32			
	43-58	10-20	1.30-1.70	2.00-6.00	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32			
	58-74	10-20	1.30-1.70	2.00-6.00	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32			
Urban land	0-79	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
TriA:												
Tribbey	0-8	10-18	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.24	.24	5	3	86
	8-15	10-18	1.65-1.75	2.00-6.00	0.07-0.20	0.0-2.9	0.0-0.5	.24	.24			
	15-62	5-18	1.35-1.75	2.00-6.00	0.07-0.20	0.0-2.9	0.0-0.5	.24	.24			
	62-80	15-30	1.35-1.70	0.60-6.00	0.13-0.20	0.0-2.9	0.0-0.0	.24	.24			
URB:												
Urban land	0-80	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
VanA:												
Vanoss	0-8	15-26	1.30-1.50	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	8-14	18-30	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.32	.32			
	14-30	27-35	1.45-1.70	0.60-2.00	0.15-0.22	3.0-5.9	0.5-1.0	.32	.32			
	30-39	27-35	1.45-1.70	0.60-2.00	0.15-0.22	3.0-5.9	0.5-1.0	.32	.32			
	39-59	18-35	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-1.0	.32	.32			
	59-76	18-35	1.40-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
VanB:												
Vanoss	0-8	15-26	1.30-1.50	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	8-14	18-30	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.32	.32			
	14-19	18-30	1.40-1.70	0.60-2.00	0.15-0.24	3.0-5.9	0.5-2.0	.32	.32			
	19-33	27-35	1.45-1.70	0.60-2.00	0.15-0.22	3.0-5.9	0.5-1.0	.32	.32			
	33-52	10-35	1.40-1.70	0.60-2.00	0.11-0.24	0.0-2.9	0.5-1.0	.32	.32			
	52-80	18-35	1.40-1.70	0.60-2.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
W:												
Water.												
WauA:												
Waurika	0-10	15-25	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-3.0	.49	.49	5	6	48
	10-13	15-25	1.30-1.60	0.60-2.00	0.15-0.20	0.0-2.9	0.5-1.0	.49	.49			
	13-38	40-60	1.35-1.60	0.00-0.06	0.10-0.17	6.0-8.9	1.0-2.0	.37	.37			
	38-69	30-50	1.40-1.70	0.06-0.20	0.10-0.19	6.0-8.9	0.0-1.0	.37	.37			
	69-84	30-50	1.35-1.70	0.00-0.20	0.10-0.19	3.0-8.9	0.0-1.0	.43	.43			
WtgA:												
Watonga	0-9	40-60	1.25-1.45	0.00-0.06	0.12-0.18	6.0-8.9	1.0-3.0	.37	.37	5	4	86
	9-25	40-60	1.25-1.45	0.00-0.06	0.12-0.22	9.0-25.0	1.0-3.0	.37	.37			
	25-42	35-60	1.35-1.70	0.00-0.06	0.12-0.20	9.0-25.0	0.5-2.0	.37	.37			
	42-80	35-50	1.35-1.70	0.00-0.06	0.12-0.20	6.0-8.9	0.5-1.0	.37	.37			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
WuUA:												
Watonga---------------	0-13	40-60	1.25-1.45	0.00-0.06	0.12-0.18	6.0-8.9	1.0-3.0	.37	.37	5	4	86
	13-34	40-60	1.25-1.45	0.00-0.06	0.12-0.22	9.0-25.0	1.0-3.0	.37	.37			
	34-54	35-60	1.35-1.70	0.00-0.06	0.12-0.20	9.0-25.0	0.5-2.0	.37	.37			
	54-80	35-50	1.35-1.70	0.00-0.06	0.12-0.20	6.0-8.9	0.5-1.0	.37	.37			
Urban land------------	0-80	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
YaGA:												
Yahola----------------	0-10	10-18	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.20	.20	5	3	86
	10-24	5-18	1.30-1.70	2.00-6.00	0.13-0.20	0.0-2.9	0.0-0.5	.32	.32			
	24-42	5-18	1.30-1.70	2.00-6.00	0.13-0.20	0.0-2.9	0.0-0.5	.32	.32			
	42-79	5-18	1.30-1.70	2.00-6.00	0.07-0.19	0.0-2.9	0.0-0.5	.32	.32			
Gaddy-----------------	0-8	10-18	1.30-1.60	2.00-6.00	0.11-0.15	0.0-2.9	0.0-0.5	.20	.20	5	3	86
	8-21	5-35	1.50-1.70	6.00-20.00	0.06-0.10	0.0-2.9	0.5-1.0	.17	.17			
	21-80	5-35	1.50-1.70	6.00-20.00	0.06-0.10	0.0-2.9	0.5-1.0	.17	.17			
YahA:												
Yahola----------------	0-6	10-18	1.40-1.65	2.00-6.00	0.13-0.19	0.0-2.9	0.5-1.0	.20	.20	5	3	86
	6-11	5-18	1.30-1.70	2.00-6.00	0.13-0.20	0.0-2.9	0.0-0.5	.32	.32			
	11-71	5-18	1.30-1.70	2.00-6.00	0.07-0.19	0.0-2.9	0.0-0.5	.32	.32			
	71-96	5-18	1.30-1.70	2.00-6.00	0.07-0.19	0.0-2.9	0.0-0.5	.32	.32			
YaUA:												
Yahola----------------	0-4	10-18	1.30-1.55	2.00-6.00	0.13-0.20	0.0-2.9	0.5-1.0	.32	.32	5	5	56
	4-22	5-18	1.30-1.70	2.00-6.00	0.13-0.20	0.0-2.9	0.0-0.5	.32	.32			
	22-48	5-18	1.30-1.70	2.00-6.00	0.13-0.20	0.0-2.9	0.0-0.5	.32	.32			
	48-80	5-18	1.30-1.70	2.00-6.00	0.07-0.19	0.0-2.9	0.0-0.5	.32	.32			
Urban land------------	0-80	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---
ZanB:												
Zaneis----------------	0-9	15-26	1.30-1.60	0.60-2.00	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	4	5	56
	9-14	18-30	1.40-1.70	0.60-2.00	0.12-0.20	0.0-2.9	0.5-2.0	.37	.37			
	14-35	20-38	1.45-1.70	0.20-0.60	0.12-0.20	3.0-5.9	0.5-1.0	.32	.32			
	35-54	20-38	1.45-1.70	0.20-0.60	0.12-0.20	3.0-5.9	0.5-1.0	.32	.32			
	54-59	18-30	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32			
	59-72	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
ZanC:												
Zaneis----------------	0-12	15-26	1.30-1.60	0.60-2.00	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	4	5	56
	12-19	18-30	1.40-1.70	0.60-2.00	0.12-0.20	0.0-2.9	0.5-2.0	.37	.37			
	19-31	20-38	1.45-1.70	0.20-0.60	0.12-0.20	3.0-5.9	0.5-1.0	.32	.32			
	31-48	20-38	1.45-1.70	0.20-0.60	0.12-0.20	3.0-5.9	0.5-1.0	.32	.32			
	48-59	18-30	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32			
	59-65	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
ZanC2:												
Zaneis----------------	0-12	15-26	1.30-1.60	0.60-2.00	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	4	5	56
	12-30	18-30	1.40-1.70	0.60-2.00	0.12-0.20	0.0-2.9	0.5-2.0	.37	.37			
	30-40	20-38	1.45-1.70	0.20-0.60	0.12-0.20	3.0-5.9	0.5-1.0	.32	.32			
	40-47	18-30	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32			
	47-55	18-30	1.40-1.70	0.60-2.00	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32			
	55-65	---	1.85-2.00	0.00-0.20	---	---	---	---	---			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
ZaUC:												
Zaneis----------------	0-10	15-26	1.30-1.60	0.60-2.00	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	4	5	56
	10-16	18-30	1.40-1.70	0.60-2.00	0.12-0.20	0.0-2.9	0.5-2.0	.37	.37			
	16-23	20-38	1.45-1.70	0.20-0.60	0.12-0.20	3.0-5.9	0.5-1.0	.32	.32			
	23-32	20-38	1.45-1.70	0.20-0.60	0.12-0.20	3.0-5.9	0.5-1.0	.32	.32			
	32-42	20-38	1.45-1.70	0.20-0.60	0.12-0.20	3.0-5.9	0.5-1.0	.32	.32			
	42-50	---	1.85-2.00	0.00-0.20	---	---	---	---	---			
Urban land------------	0-60	---	---	0.06-2.00	0.00-0.00	---	---	---	---	---	---	---

Physical Analyses of Selected Soils

The results of physical analyses of several pedons are given in the table “Physical Properties of Selected Soils” in this section. The data are for soils sampled at carefully selected sites. The pedons are typical of the series described in Part I of this survey. Soil samples were analyzed by the Soil Survey Laboratory, Lincoln, Nebraska.

Most determinations, except for those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods.

Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of all material less than 2 mm (3A1).

Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all material less than 2 mm (3A1).

Sand—(0.05-2.0 mm fraction) weight percentages of material less than 2 mm (3A1).

Bulk density—of material less than 2 mm, saran-coated clods field moist (4A1a), $^1/_3$ bar (4A1d), ovendry (4A1h).

Water-retention difference—between $^1/_3$ bar and 15 bars for whole soil (4C1).

Water retained—pressure extraction, percentage of ovendry weight of material less than 2 mm; $^1/_3$ or $^1/_{10}$ bar (4B1), 15 bars (4B2).

Linear extensibility—change in clod dimension based on whole soil (4D).

Physical Properties of Selected Soils

(The symbol < means less than. TR means trace. Dashes indicate that analyses were not made.)

Soil name and sample number*	Horizon	Depth	Clay (<0.002)	Silt: Total silt (0.002-0.05mm)	Silt: Fine (0.002-0.02mm)	Silt: Coarse (0.02-0.05mm)	Sand: Total sand (0.05-2.0mm)	Sand: Very fine (0.05-0.10mm)	Sand: Fine (0.10-0.25mm)	Sand: Medium (0.25-0.50mm)	Sand: Coarse (0.5-1mm)	Sand: Very coarse (2.0-1.0mm)	Bulk density: 1/3 bar	Bulk density: Oven-dry	Water retention difference 1/3 bar 15 bar	Water content: 1/3 bar	Water content: 15 bar	COLE
		In	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*g/cm³*	*g/cm³*	*cm/cm*	*Pct*	*Pct*	
Bethany	A1	0-6	18.1	58.4	17.1	41.3	23.5	19.2	2.8	1.3	0.2	TR	1.37	1.46	0.29	21.5	0.6	0.021
S91OK-109-006	A22	6-13	21.0	56.2	15.9	40.3	22.8	18.5	2.8	1.2	0.2	0.1	1.32	1.38	0.27	21.6	1.0	0.015
	BA	13-18	26.6	56.1	16.9	39.2	17.3	14.2	2.0	0.8	0.2	0.1	1.21	1.45	0.12	21.6	11.4	0.062
	Btb1	18-32	40.7	43.9	19.9	24.0	15.4	12.8	1.6	0.7	0.3	---	1.46	1.87	0.12	26.3	17.8	0.086
	Btb2	32-40	38.7	43.5	20.2	23.3	17.8	13.8	2.2	1.1	0.3	0.4	1.50	1.82	0.13	25.3	16.8	0.066
	Btkb1	40-51	38.3	39.4	15.4	24.0	22.3	16.4	3.3	1.4	0.7	0.5	1.48	1.81	0.13	26.0	17.2	0.068
	Btkb2	51-59	37.2	37.2	13.0	24.2	25.6	19.1	3.9	1.8	0.6	0.2	1.46	1.71	0.12	25.9	17.5	0.054
	B'tb1	59-69	35.8	34.8	12.4	22.4	29.4	21.4	5.0	2.0	0.8	0.2	1.43	1.69	0.15	27.3	17.1	0.057
	B'tb2	69-84	33.3	35.7	11.7	24.0	31.0	23.3	4.7	2.1	0.8	0.1	1.49	1.75	0.13	24.1	15.6	0.055
	Btb3	84-95	27.2	41.7	11.1	30.6	31.1	23.9	4.5	1.9	0.7	0.1	1.60	1.94	0.11	20.3	13.2	0.066
	Btb4	95-114	25.1	37.4	9.6	27.8	37.5	29.3	5.3	2.3	0.6	TR	1.69	1.74	0.13	19.1	11.4	0.010
Canadian	Ap	0-8	8.1	25.1	5.3	19.8	66.8	48.0	18.6	0.2	---	TR	---	---	---	---	3.7	---
S93OK-109-002	A	8-19	9.7	23.6	5.5	18.1	66.7	48.0	18.0	0.6	0.1	TR	---	---	---	---	4.5	---
	Bw	19-30	10.4	25.8	5.0	20.8	63.8	51.5	11.9	0.3	0.1	---	---	---	---	---	5.2	---
	C	30-65	7.3	28.3	6.6	21.7	64.4	38.3	25.9	0.2	TR	---	---	---	---	---	2.2	---
Doolin	Ap	0-8	30.4	59.0	20.8	38.2	10.6	8.8	1.1	0.4	0.2	0.1	---	---	---	---	11.6	---
S92OK-109-004	Bt1	8-15	46.3	47.2	21.7	25.5	6.5	5.6	0.6	0.2	0.1	TR	---	---	---	---	19.0	---
	Bt2	15-23	45.4	47.7	21.6	26.1	6.9	5.9	0.7	0.2	0.1	TR	---	---	---	---	18.1	---
	Btk1	23-35	43.8	47.8	22.5	25.3	8.4	5.8	0.9	0.5	0.6	0.6	---	---	---	---	17.5	---
	Btk2	35-46	45.7	45.4	22.8	22.6	8.9	6.7	1.0	0.4	0.3	0.5	---	---	---	---	17.7	---
	Btky	46-56	40.3	51.3	29.4	21.9	8.4	4.3	1.1	0.8	1.0	1.2	---	---	---	---	16.8	---
	Cr	56-72	27.8	48.5	22.6	25.9	23.7	14.0	9.4	0.2	0.1	---	---	---	---	---	21.6	---
Hibsaw	Ap	0-8	24.3	48.5	22.1	26.4	27.2	20.4	5.9	0.7	0.2	TR	---	---	---	---	13.3	---
S93OK-109-001	Bw	8-18	21.8	51.0	20.2	30.8	27.2	23.7	3.3	0.1	0.1	TR	---	---	---	---	11.2	---
	Ck	18-30	28.3	56.5	28.4	28.1	15.2	10.5	4.1	0.2	0.2	0.2	---	---	---	---	15.1	---
	C1	30-55	12.6	40.3	11.1	29.2	47.1	33.5	13.0	0.2	0.2	0.2	---	---	---	---	6.3	---
	C2	55-74	43.6	47.9	29.8	18.1	8.5	5.0	3.2	0.1	0.1	0.1	---	---	---	---	19.2	---
	Ab	74-96	26.9	50.8	24.3	26.5	22.3	10.1	11.0	0.7	0.2	0.3	---	---	---	---	14.5	---

* See footnote at end of table.

Physical Properties of Selected Soils--Continued

Soil name and sample number*	Horizon	Depth	Clay (<0.002)	Silt: Total silt (0.002-0.05mm)	Silt: Fine (0.002-0.02mm)	Silt: Coarse (0.02-0.05mm)	Sand: Total sand (0.05-2.0mm)	Sand: Very fine (0.05-0.10mm)	Sand: Fine (0.10-0.25mm)	Sand: Medium (0.25-0.50mm)	Sand: Coarse (0.5-1mm)	Sand: Very coarse (2.0-1.0mm)	Bulk density: 1/3 bar	Bulk density: Oven-dry	Water retention difference 1/3 bar 15 bar	Water content: 1/3 bar	Water content: 15 bar	COLE
		In	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*g/cm³*	*g/cm³*	*cm/cm*	*Pct*	*Pct*	
Huska	Ap	0-3	18.9	27.9	10.4	17.5	53.2	21.7	29.8	0.9	0.5	0.3	---	---	---	---	7.8	---
S92OK-109-001	Bt1	3-7	44.6	29.9	14.8	15.1	25.5	10.5	14.0	0.6	0.3	0.1	---	---	---	---	16.7	---
	Bt2	7-11	45.4	29.9	15.1	14.8	24.7	10.0	12.9	0.6	0.6	0.6	---	---	---	---	17.5	---
	Btk	11-18	43.8	32.5	16.1	16.4	23.7	9.8	12.6	0.5	0.5	0.3	---	---	---	---	16.4	---
	Btkn	18-28	39.2	41.3	19.5	21.8	19.5	10.5	5.9	0.8	1.0	1.3	---	---	---	---	14.4	---
	Btn	28-38	32.0	53.3	24.2	29.1	14.7	12.5	1.0	0.4	0.5	0.3	---	---	---	---	12.1	---
	Cr	38-45	30.1	57.0	28.1	28.9	12.9	11.5	0.6	0.3	0.3	0.2	---	---	---	---	13.0	---
Kirkland	A1	0-10	16.9	65.6	16.9	48.7	17.5	10.6	2.8	2.4	1.2	0.5	---	---	---	---	7.2	---
S88OK-109-003	A2	10-12	23.0	59.0	19.0	40.0	18.0	12.7	2.2	1.8	0.9	0.4	---	---	---	---	9.4	---
	Bt1	12-24	43.9	48.5	19.7	28.8	7.6	4.4	1.1	1.1	0.7	0.3	---	---	---	---	18.7	---
	Bt2	24-33	37.8	52.9	23.9	29.0	9.3	5.1	1.3	1.3	0.7	0.9	---	---	---	---	16.1	---
	Btky1	33-44	36.6	55.2	22.5	32.7	8.2	4.4	1.5	1.2	0.8	0.3	---	---	---	---	16.2	---
	Btky2	44-63	36.8	46.3	17.9	28.4	16.9	11.1	2.6	1.9	0.9	0.4	---	---	---	---	16.7	---
	Btk1	63-72	37.7	41.9	15.1	26.8	20.4	10.8	3.5	3.2	2.3	0.6	---	---	---	---	17.3	---
	Btk2	72-87	34.4	36.2	15.4	20.8	29.4	12.2	8.4	4.9	2.3	1.6	---	---	---	---	14.7	---
	2C	87-102	---	---	---	---	---	---	---	---	---	---	---	---	---	---	11.3	---
Kirkland	Ap	0-10	16.0	63.5	16.9	46.6	20.5	16.7	2.3	1.0	0.3	0.2	---	---	---	---	8.3	---
S93OK-109-003	Bt1	10-22	39.1	49.8	21.4	28.4	11.1	9.0	1.3	0.7	0.1	TR	---	---	---	---	18.5	---
	Bt2	22-37	34.7	53.2	23.6	29.6	12.1	9.8	1.4	0.7	0.2	TR	---	---	---	---	17.2	---
	Btk1	37-53	33.0	49.2	18.8	30.4	17.8	12.9	2.3	1.3	0.6	0.7	---	---	---	---	17.0	---
	Btk2	53-81	31.3	47.0	14.3	32.7	21.7	17.5	3.0	0.7	0.3	0.2	---	---	---	---	16.6	---
	B't	81-107	29.2	35.7	13.2	22.5	35.1	26.0	7.6	1.4	0.1	TR	---	---	---	---	13.4	---
Kirkland	A	0-7	12.7	67.6	20.3	47.4	19.7	17.2	1.6	0.7	0.2	TR	---	---	---	---	7.9	---
S93OK-109-004	Bt1	7-14	42.0	48.2	18.7	29.5	9.8	8.5	0.8	0.3	0.2	---	---	---	---	---	23.4	---
	Bt2	14-24	40.8	49.8	19.6	30.2	9.4	7.9	1.0	0.3	0.1	0.1	---	---	---	---	20.0	---
	Btn1	24-36	36.3	50.4	18.9	31.5	13.3	9.8	1.3	0.7	0.7	0.8	---	---	---	---	18.2	---
	Btn2	36-46	35.1	49.1	19.9	29.2	15.8	12.1	1.5	0.6	0.5	1.1	---	---	---	---	17.9	---
	Btn3	46-63	36.2	47.3	17.0	30.3	16.5	13.2	1.5	0.5	0.4	0.9	---	---	---	---	17.4	---
	Btn4	63-80	38.3	45.1	16.7	28.4	16.6	14.3	1.5	0.4	0.2	0.2	---	---	---	---	18.1	---
	Btn5	80-111	33.9	46.0	16.4	29.7	20.1	17.5	1.9	0.5	0.2	TR	---	---	---	---	15.6	---

* See footnote at end of table.

Physical Properties of Selected Soils--Continued

Soil name and sample number*	Horizon	Depth	Particle-size distribution: Clay (<0.002)	Silt: Total silt (0.002-0.05mm)	Silt: Fine (0.002-0.02mm)	Silt: Coarse (0.02-0.05mm)	Sand: Total sand (0.05-2.0mm)	Sand: Very fine (0.05-0.10mm)	Sand: Fine (0.10-0.25mm)	Sand: Medium (0.25-0.50mm)	Sand: Coarse (0.5-1mm)	Sand: Very coarse (2.0-1.0mm)	Bulk density: 1/3 bar	Bulk density: Oven-dry	Water retention difference 1/3 bar 15 bar	Water content: 1/3 bar	Water content: 15 bar	COLE
		In	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*g/cm^3*	*g/cm^3*	*cm/cm*	*Pct*	*Pct*	
Piedmont	Ap	0-4	21.5	61.3	20.4	40.9	17.2	15.2	1.3	0.5	0.2	TR	1.52	1.60	0.17	21.0	9.9	0.017
S91OK-109-004	BA	4-8	30.8	59.2	22.9	36.3	10.0	8.8	0.6	0.4	0.2	TR	1.40	1.53	0.15	22.9	12.0	0.030
	Btss	8-16	49.8	44.5	20.8	23.7	5.7	4.9	0.4	0.3	0.1	---	1.42	1.92	0.13	28.9	20.0	0.105
	Btssk	16-21	47.4	46.3	22.7	23.6	6.3	5.4	0.5	0.2	0.2	TR	1.45	1.93	0.10	27.5	20.4	0.100
	Btssk2	21-29	39.9	54.0	30.7	23.3	6.1	4.4	0.5	0.5	0.3	0.4	1.57	1.87	0.09	22.2	16.2	0.059
	BCk	29-35	27.2	69.7	39.0	30.7	3.1	1.9	0.4	0.2	0.3	0.3	1.55	1.83	0.13	23.2	14.8	0.055
	Cr1	35-51	12.0	71.4	31.6	39.8	16.6	14.2	1.1	0.4	0.3	0.6	1.60	1.67	0.16	19.8	10.0	0.014
	Cr2	51-59	8.3	58.7	24.0	34.7	33.0	24.1	6.9	1.3	0.6	0.1	1.78	1.88	0.15	16.9	8.6	0.018
Renfrow	Ap	0-3	18.8	54.2	14.6	39.6	27.0	18.9	4.1	2.9	1.0	0.1	1.21	1.31	0.24	31.2	11.4	0.027
S91OK-109-005	A	3-8	22.8	48.6	12.7	35.9	28.6	20.6	4.1	2.9	0.8	0.2	1.38	1.47	0.15	21.9	10.7	0.021
	BA	8-15	28.3	45.9	13.0	32.9	25.8	18.6	3.8	2.6	0.7	0.1	1.38	1.51	0.15	23.2	12.6	0.030
	Bt1	15-26	41.6	40.0	14.7	25.3	18.4	12.5	2.8	1.9	0.8	0.4	1.48	1.78	0.12	25.0	17.2	0.063
	Bt2	26-43	38.5	42.9	15.0	27.9	18.6	12.5	3.1	1.6	0.8	0.6	1.48	1.83	0.13	25.0	16.1	0.073
	Btk1	43-52	37.6	46.2	21.4	24.8	16.2	9.5	2.7	2.7	0.8	0.8	1.54	1.84	0.10	23.8	16.5	0.056
	Btk2	52-68	36.0	55.9	32.2	23.7	8.1	6.1	0.8	0.5	0.4	0.3	1.47	1.76	0.13	27.2	18.1	0.060
	B't	68-82	40.7	52.0	29.5	22.5	7.3	6.4	0.4	0.2	0.1	0.2	1.50	1.91	0.13	26.8	18.0	0.083
	BC	82-96	37.2	54.5	30.1	24.4	8.3	6.9	0.8	0.3	0.2	0.1	1.46	1.88	0.15	27.9	17.5	0.088
	2Bt	96-120	43.9	51.9	33.0	18.9	4.2	3.7	0.4	0.1	TR	---	1.53	1.91	0.20	25.3	12.5	0.077
	3C	120-143	26.6	52.3	18.6	33.7	21.1	18.9	2.0	0.1	0.1	TR	1.54	1.62	0.14	22.2	12.8	0.017
Renthin	Ap	0-4	21.3	52.7	16.6	36.1	26.0	22.2	2.9	0.6	0.3	TR	1.31	1.42	0.21	26.9	11.1	0.027
S91OK-109-001	BA	4-10	30.0	42.4	15.1	27.3	27.6	23.8	2.9	0.6	0.3	TR	1.32	1.50	0.18	27.0	13.4	0.044
	Bt1	10-15	40.3	37.0	16.2	20.8	22.7	21.5	0.6	0.4	0.2	TR	1.34	1.60	0.14	27.3	17.1	0.061
	Bt2	15-22	44.0	35.5	18.2	17.4	20.5	18.1	1.6	0.5	0.2	0.1	1.41	1.79	0.14	28.4	18.2	0.083
	Btss	22-29	42.5	36.2	17.0	19.2	21.3	18.8	1.9	0.4	0.2	---	1.47	1.92	0.13	26.6	17.6	0.093
	Btssk	29-42	42.6	25.1	12.1	13.0	32.3	29.4	2.2	0.4	0.2	0.1	1.57	1.91	0.10	23.4	16.8	0.067
	Btk	42-55	36.5	19.8	13.2	6.6	43.7	42.3	0.8	0.3	0.3	TR	1.68	1.92	0.11	19.8	12.9	0.045
	Cr1	55-66	46.2	37.9	32.1	5.8	15.9	13.2	0.9	0.5	0.6	0.7	1.63	2.05	0.12	23.2	16.0	0.079
	Cr2	66-77	19.3	50.3	17.2	33.1	30.4	22.4	5.9	1.4	0.6	0.1	1.90	1.96	0.06	10.7	7.4	0.010
Stephenville	A	0-5	4.4	14.5	5.5	9.0	81.1	23.6	53.0	3.9	0.3	0.3	1.48	1.48	0.09	8.0	1.8	---
S91OK-109-002	E	5-15	4.2	10.5	2.6	7.9	85.3	23.1	58.5	3.5	0.2	TR	---	---	---	---	1.1	---
	Bt1	15-25	24.8	10.8	4.3	6.5	64.4	20.3	41.0	2.9	0.1	0.1	1.60	1.72	0.13	17.6	9.3	0.024
	Bt2	25-33	20.4	8.7	3.5	5.2	70.9	21.9	47.7	1.2	0.1	TR	1.57	1.66	0.10	13.7	7.4	0.019
	Cr1	33-40	11.0	4.2	2.5	1.7	84.8	20.6	63.7	0.5	TR	---	1.73	1.76	0.04	6.0	3.9	0.006
	Cr2	40-51	8.7	2.6	1.9	0.7	88.7	17.1	71.2	0.4	TR	---	1.75	1.77	0.04	5.8	3.5	0.004

* See footnote at end of table.

Physical Properties of Selected Soils--Continued

Soil name and sample number*	Horizon	Depth	Particle-size distribution: Clay (<0.002)	Silt: Total silt (0.002-0.05mm)	Silt: Fine (0.002-0.02mm)	Silt: Coarse (0.02-0.05mm)	Sand: Total sand (0.05-2.0mm)	Sand: Very fine (0.05-0.10mm)	Sand: Fine (0.10-0.25mm)	Sand: Medium (0.25-0.50mm)	Sand: Coarse (0.5-1mm)	Sand: Very coarse (2.0-1.0mm)	Bulk density: 1/3 bar	Bulk density: Oven-dry	Water retention difference 1/3 bar 15 bar	Water content: 1/3 bar	Water content: 15 bar	COLE
		In	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*g/cm*^{3}	*g/cm*^{3}	*cm/cm*	*Pct*	*Pct*	
Teval	A	0-6	18.3	41.3	10.8	30.6	40.4	18.0	9.2	9.2	3.3	0.7	---	---	---	---	9.1	---
S92OK-109-002	BA	6-10	25.8	34.9	9.6	25.3	39.3	16.0	8.3	9.5	3.7	1.8	---	---	---	---	9.8	---
	Bt1	10-14	31.2	34.1	10.4	23.7	34.7	14.4	8.7	8.6	2.3	0.7	---	---	---	---	11.4	---
	Bt2	14-25	30.6	34.7	13.3	21.4	34.7	13.9	10.7	9.5	0.5	0.1	---	---	---	---	10.4	---
	Btk	25-34	24.8	42.9	18.6	24.3	32.3	12.4	8.0	9.6	1.5	0.8	---	---	---	---	8.9	---
	2C1	34-55	17.8	36.2	17.9	18.3	46.0	10.7	6.4	12.8	12.2	3.9	---	---	---	---	7.0	---
	2C2	55-83	1.9	17.3	5.3	12.0	80.8	12.6	43.3	23.9	1.0	TR	---	---	---	---	1.5	---
Waurika	Ap	0-8	19.7	56.3	20.0	36.3	24.0	16.5	5.3	1.7	0.3	0.2	---	---	---	---	7.7	---
S92OK-109-003	E	10-13	14.0	60.9	19.6	41.3	25.1	18.5	4.4	1.6	0.4	0.2	---	---	---	---	5.3	---
	Bt1	13-24	29.4	41.1	15.4	25.7	29.5	14.9	8.5	3.4	1.2	1.5	---	---	---	---	12.7	---
	Bt2	24-38	31.9	35.5	12.8	22.7	32.6	16.4	9.2	3.0	1.4	2.6	---	---	---	---	13.1	---
Zaneis	A1	0-6	15.5	39.4	13.7	25.7	45.1	26.2	18.0	0.7	0.2	TR	1.37	1.44	0.19	22.4	8.6	0.017
S91OK-109-003	A2	6-12	17.5	36.0	13.0	23.0	46.5	25.2	20.1	1.0	0.2	---	1.44	1.50	0.16	19.2	8.0	0.014
	BA	12-19	19.8	36.4	13.5	22.9	43.8	24.5	18.0	0.9	0.2	0.2	1.43	1.51	0.15	20.3	9.7	0.018
	Bt1	19-31	28.6	30.4	14.4	16.0	41.0	19.2	20.6	0.8	0.3	0.1	1.51	1.65	0.10	18.9	12.2	0.030
	Bt2	31-39	26.8	20.0	10.0	10.0	53.2	23.8	28.6	0.7	0.1	TR	1.67	1.79	0.08	16.3	11.3	0.023
	Bt3	39-47	23.1	17.8	8.6	9.2	59.1	24.7	33.6	0.6	0.1	0.1	1.72	1.78	0.08	14.0	9.4	0.012
	Bt4	47-55	23.2	13.7	6.8	6.9	63.1	26.9	35.6	0.3	0.1	0.2	1.71	1.78	0.08	14.7	9.9	0.013
	BC	55-59	21.3	5.0	2.8	2.2	73.7	27.4	46.2	0.1	TR	---	1.71	1.76	0.08	13.8	9.1	0.010
	Cr	59-65	11.9	4.2	2.9	1.3	83.9	24.8	59.0	0.1	TR	---	1.76	1.83	0.13	12.5	4.9	0.013

* The location of sampled pedons is as follows:

Bethany (S91OK-109-006), about 800 feet south and 140 feet west of the northeast corner of sec. 16, T. 14 N., R. 4 W. The clay content of the BA horizon is 0.4 percent less than the series allows but is within the normal limits of laboratory error. This is the typical pedon for the BetB map unit in the survey area.

Canadian (S93OK-109-002), about 1,300 feet north and 100 feet west of the southeast corner of sec. 21, T. 13 N., R. 1 W. The very fine sand percentage throughout the profile is higher than the series allows. Because these very fine sand percentages are marginally higher, the very fine sandy loam textural class will not be added to the range of characteristics in the Official Series Description. This is the typical pedon for the Official Series Description and for the taxonomic unit and the CaaA map unit in the survey area.

Doolin (S92OK-109-004), about 1,700 feet south and 550 feet west of the northeast corner of sec. 9, T. 13 N., R. 4 W. The soil depth is slightly less and the clay content of the Ap horizon is slightly higher than the series allows; however, this pedon is similar to that of the KrdA map unit in the survey area.

Hibsaw (S93OK-109-001), about 600 feet south and 150 feet west of the northeast corner of sec. 14, T. 14 N., R. 1 E. This is the typical pedon for the Official Series Description and for the taxonomic unit and the HiLA map unit in the survey area.

Huska (S92OK-109-001), about 2,080 feet south and 1,780 feet east of the northwest corner of sec. 11, T. 14 N., R. 3 W. The soil depth is slightly shallower and the clay content of the Btn horizon is slightly less than the series allows; however, this is the typical pedon for the Huska part of the PdHC map unit in the survey area.

Kirkland (S88OK-109-003), about 1,750 feet north and 360 feet east of the southwest corner of sec. 15, T. 14 N., R. 4 W. The clay content of the Bt2 horizon is slightly less than the series allows; however, this difference does not affect classification. This is the typical pedon for the KrdA map unit in the survey area.

Kirkland (S93OK-109-003), about 480 feet north and 1,250 feet west of the southeast corner of sec. 15, T. 11 N., R. 4 W. The clay content throughout the subsoil horizons is slightly less than the series allows. This difference, however, does not affect classification, and this pedon is similar to that of the KrdA map unit in the survey area.

Kirkland (S93OK-109-004), about 2,250 feet north and 120 feet east of the southeast corner of sec. 25, T. 11 N., R. 4 W. This pedon was sampled as a project to determine the exchangeable sodium percentage and as support data for the KrdA map unit in the survey area.

Piedmont (S91OK-109-004), about 1,300 feet south and 2,000 feet west of the northeast corner of sec. 9, T. 14 N., R. 4 W. This is the typical pedon for the Official Series Description and for the taxonomic unit and the PimB map unit in the survey area.

Renfrow (S91OK-109-005), about 600 feet south and 500 feet east of the northwest corner of sec. 14, T. 14 N., R. 4 W. This is the typical pedon for the RenB map unit in the survey area.

Renthin (S91OK-109-001), about 2,500 feet north and 1,500 feet east of the southwest corner of sec. 26, T. 13 N., R. 3 W. This is the typical pedon for the Official Series Description and for the taxonomic unit and the RinB map unit in the survey area.

Stephenville (S91OK-109-002), about 750 feet south and 450 feet east of the northwest corner of sec. 8, T. 12 N., R. 1 W. This is the typical pedon for the Official Series Description and the taxonomic unit and provides support data for the Stephenville part of the SDND map unit in the survey area.

Teval (S92OK-109-002), about 2,500 feet south and 1,550 feet west of the northeast corner of sec. 2, T. 14 N., R. 4 W. This pedon was sampled as support data for the series and the TevD map unit in the survey area.

Waurika (S92OK-109-003), about 2,230 feet north and 2,540 feet west of the southeast corner of sec. 6, T. 12 N., R. 4 W. The clay content of the E and Bt horizons is slightly less than the series allows; however, this difference is thought to be a laboratory error. This is the typical pedon for the WauA map unit in the survey area.

Zaneis (S91OK-109-003), about 100 feet south and 1,000 feet east of the northwest corner of sec. 6, T. 14 N., R. 2 W. This is the typical pedon for the Official Series Description and for the taxonomic unit and the ZanC map unit in the survey area.

Chemical Properties

The table “Chemical Properties of the Soils” shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the series descriptions in Part I of this survey.

Cation-exchange capacity is the total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. Soils having a high cation-exchange capacity can retain cations. The ability to retain cations helps to prevent the pollution of ground water.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the soil. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is given as the percent, by weight, of hydrated calcium sulfates in the soil. Gypsum is partially soluble in water and can be dissolved and removed by water. Soils that have a high content of gypsum (more than 10 percent) may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter (decisiemens per meter) at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of the soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils having a sodium adsorption ratio of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
AhpA:							
Ashport	0-5	16-21	5.6-8.4	0	0	0	0
	5-14	16-21	5.6-8.4	0	0	0	0
	14-36	11-21	6.1-8.4	0-1	0	0	0
	36-96	11-21	6.1-8.4	0-1	0	0	0
AmbE:							
Amber	0-9	7.0-11	6.1-8.4	0	0	0	0
	9-11	7.0-11	6.1-8.4	0	0	0	0
	11-22	7.0-11	6.1-8.4	0-1	0	0	0
	22-38	4.0-11	7.9-8.4	0-5	0	0	0
	38-84	4.0-21	7.9-8.4	0-5	0	0	0
AshA:							
Asher	0-8	16-24	6.1-8.4	0	0	0	0
	8-14	16-24	6.1-8.4	0	0	0	0
	14-31	16-24	6.6-8.4	0	0	0	0
	31-88	5.0-11	6.6-8.4	0	0	0	0
AspA:							
Ashport	0-7	9.0-16	5.6-8.4	0	0	0	0
	7-15	9.0-16	5.6-8.4	0	0	0	0
	15-29	11-21	6.1-8.4	0-1	0	0	0
	29-72	11-21	6.1-8.4	0-1	0	0	0
	72-83	11-21	6.1-8.4	0-1	0	0	0
AstA:							
Ashport	0-10	9.0-16	5.6-8.4	0	0	0	0
	10-24	11-21	6.1-8.4	0-1	0	0	0
	24-36	11-21	6.1-8.4	0-1	0	0	0
	36-48	11-21	6.1-8.4	0-1	0	0	0
	48-64	11-21	6.1-8.4	0-1	0	0	0
BetA:							
Bethany	0-6	10-16	5.1-7.8	0	0	0	0
	6-14	10-16	5.1-7.8	0	0	0	0
	14-18	17-21	6.1-7.8	0	0	0	0
	18-36	21-30	6.6-8.4	0-2	0	0	0
	36-56	21-30	6.6-8.4	0-10	0	0.0-2.0	0-4
	56-80	21-30	6.6-8.4	0-10	0	0.0-2.0	0-4
BetB:							
Bethany	0-6	10-16	5.1-7.8	0	0	0	0
	6-13	10-16	5.1-7.8	0	0	0	0
	13-19	17-21	6.1-7.8	0	0	0	0
	19-32	21-30	6.6-8.4	0-2	0	0	0
	32-59	21-30	6.6-8.4	0-10	0	0.0-2.0	0-4
	59-84	21-30	6.6-8.4	0-10	0	0.0-2.0	0-4
BeUB:							
Bethany	0-12	10-16	5.1-7.8	0	0	0	0
	12-16	17-21	6.1-7.8	0	0	0	0
	16-28	21-30	6.6-8.4	0-2	0	0	0
	28-55	21-30	6.6-8.4	0-10	0	0.0-2.0	0-4
	55-84	21-30	6.6-8.4	0-10	0	0.0-2.0	0-4
Urban land	0-80	---	---	---	---	---	---

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
CaaA:							
Canadian	0-8	3.0-11	5.6-7.8	0	0	0	0
	8-19	6.0-11	6.1-8.4	0	0	0	0
	19-30	6.0-11	6.1-8.4	0	0	0	0
	30-80	3.0-11	6.1-8.4	0	0	0	0
CaUB:							
Canadian	0-8	3.0-11	5.6-7.8	0	0	0	0
	8-18	6.0-11	6.1-8.4	0	0	0	0
	18-28	6.0-11	6.1-8.4	0	0	0	0
	28-43	3.0-11	6.1-8.4	0	0	0	0
	43-52	3.0-11	6.1-8.4	0	0	0	0
	52-84	3.0-11	6.1-8.4	0	0	0	0
Urban land	0-60	---	---	---	---	---	---
CoIC2:							
Coyle	0-10	10-16	5.6-7.8	0	0	0	0
	10-13	11-16	5.6-7.8	0	0	0	0
	13-24	13-21	5.6-7.8	0	0	0	0
	24-31	11-21	5.6-7.8	0	0	0	0
	31-36	---	---	---	---	---	---
Ironmound	0-7	7.0-11	5.6-8.4	0	0	0	0
	7-12	10-21	6.1-8.4	0	0	0	0
	12-15	---	---	---	---	---	---
CoUB:							
Coyle	0-8	10-16	5.6-7.8	0	0	0	0
	8-14	11-16	5.6-7.8	0	0	0	0
	14-22	13-21	5.6-7.8	0	0	0	0
	22-30	---	---	---	---	---	---
Urban land	0-60	---	---	---	---	---	---
CoyB:							
Coyle	0-7	10-16	5.6-7.8	0	0	0	0
	7-10	11-16	5.6-7.8	0	0	0	0
	10-20	13-21	5.6-7.8	0	0	0	0
	20-27	11-21	5.6-7.8	0	0	0	0
	27-40	---	---	---	---	---	---
DalA:							
Dale	0-8	10-16	6.1-7.8	0	0	0	0
	8-14	10-16	6.1-7.8	0	0	0	0
	14-21	11-21	6.6-8.4	0-5	0	0	0
	21-27	11-21	6.6-8.4	0-5	0	0	0
	27-53	11-21	6.6-8.4	0-5	0	0	0
	53-84	11-21	6.6-8.4	0-5	0	0	0
DAM:							
Dams	0-80	---	---	---	---	---	---
DaUA:							
Dale	0-8	10-16	6.1-7.8	0	0	0	0
	8-22	10-16	6.1-7.8	0	0	0	0
	22-30	11-21	6.6-8.4	0-5	0	0	0
	30-38	11-21	6.6-8.4	0-5	0	0	0
	38-52	11-21	6.6-8.4	0-5	0	0	0
	52-84	11-21	6.6-8.4	0-5	0	0	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
DaUA:							
Urban land	0-84	---	---	---	---	---	---
DeDE:							
Derby	0-15	2.0-6.0	5.6-7.8	0	0	0	0
	15-27	1.0-7.0	5.6-7.8	0	0	0	0
	27-45	1.0-7.0	5.6-8.4	0	0	0	0
	45-61	1.0-7.0	5.6-8.4	0	0	0	0
	61-72	1.0-7.0	5.6-8.4	0	0	0	0
Dougherty	0-6	2.0-7.0	5.1-6.5	0	0	0	0
	6-24	2.0-7.0	5.1-6.5	0	0	0	0
	24-41	11-18	5.1-6.5	0	0	0	0
	41-52	8.0-15	5.1-6.5	0	0	0	0
	52-66	2.0-10	5.1-7.3	0	0	0	0
DerB:							
Derby	0-16	2.0-6.0	5.6-7.8	0	0	0	0
	16-28	1.0-7.0	5.6-7.8	0	0	0	0
	28-56	1.0-7.0	5.6-7.8	0	0	0	0
	56-100	1.0-7.0	5.6-8.4	0	0	0	0
DerE:							
Derby	0-4	2.0-6.0	5.6-7.8	0	0	0	0
	4-17	1.0-7.0	5.6-7.8	0	0	0	0
	17-34	1.0-7.0	5.6-7.8	0	0	0	0
	34-96	1.0-7.0	5.6-8.4	0	0	0	0
DleA:							
Dale	0-9	16-21	6.1-7.8	0	0	0	0
	9-22	16-21	6.1-7.8	0	0	0	0
	22-31	11-21	6.6-8.4	0-5	0	0	0
	31-39	11-21	6.6-8.4	0-5	0	0	0
	39-66	11-21	6.6-8.4	0-5	0	0	0
	66-96	11-21	6.6-8.4	0-5	0	0	0
DSRG:							
Darsil	0-6	1.0-6.0	5.1-7.8	0	0	0	0
	6-10	1.0-6.0	5.1-7.8	0	0	0	0
	10-15	---	---	---	---	---	---
Stephenville	0-4	7.0-12	5.1-6.5	0	0	0	0
	4-5	4.0-10	5.1-6.5	0	0	0	0
	5-14	11-21	4.5-6.0	0	0	0	0
	14-22	11-21	4.5-6.0	0	0	0	0
	22-30	---	---	---	---	---	---
Rock Outcrop	0-60	---	---	---	---	---	---
DUDE:							
Derby	0-6	2.0-6.0	5.6-7.8	0	0	0	0
	6-23	1.0-7.0	5.6-7.8	0	0	0	0
	23-32	1.0-7.0	5.6-7.8	0	0	0	0
	32-84	1.0-7.0	5.6-8.4	0	0	0	0
Urban land	0-60	---	---	---	---	---	---

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
DUDE:							
Dougherty------------	0-5	2.0-7.0	5.1-6.5	0	0	0	0
	5-26	2.0-7.0	5.1-6.5	0	0	0	0
	26-45	11-18	5.1-6.5	0	0	0	0
	45-63	8.0-15	5.1-6.5	0	0	0	0
	63-84	2.0-10	5.1-7.3	0	0	0	0
EasA:							
Easpur---------------	0-10	8.0-16	5.6-8.4	0	0	0	0
	10-24	11-21	6.1-8.4	0	0	0	0
	24-28	11-21	6.1-8.4	0	0	0	0
	28-60	11-21	6.1-8.4	0	0	0	0
	60-80	11-21	6.1-8.4	0-2	0	0	0
GaGA:							
Gaddy----------------	0-7	4.0-10	7.4-8.4	0-2	0	0	0
	7-19	4.0-10	7.9-8.4	1-5	0	0	0
	19-79	4.0-10	7.9-8.4	1-5	0	0	0
Gracemore------------	0-8	2.0-7.0	7.4-8.4	0-1	0	0.0-4.0	0-2
	8-11	2.0-7.0	7.9-8.4	0-1	0	0.0-4.0	0-2
	11-30	2.0-7.0	7.9-8.4	0-1	0	0.0-4.0	0-2
	30-65	2.0-7.0	7.9-8.4	0-1	0	0.0-4.0	0-2
	65-80	2.0-7.0	7.9-8.4	0-1	0	0.0-4.0	0-2
GcmA:							
Gracemont------------	0-6	24-36	6.6-8.4	0-5	0	4.0-16.0	0-4
	6-9	24-36	6.6-8.4	0-5	0	4.0-16.0	0-4
	9-15	7.0-11	7.9-8.4	0	0	4.0-16.0	0-4
	15-26	7.0-11	7.9-8.4	0	0	4.0-16.0	0-4
	26-79	2.0-10	7.9-8.4	0	0	4.0-16.0	0-4
GmtA:							
Gracemont------------	0-9	6.0-11	6.6-8.4	0-5	0	0.0-4.0	0-2
	9-12	6.0-11	6.6-8.4	0-5	0	0.0-4.0	0-2
	12-21	6.0-11	7.9-8.4	1-10	0	0.0-4.0	0-2
	21-36	6.0-11	7.9-8.4	1-10	0	0.0-4.0	0-2
	36-79	2.0-10	7.9-8.4	0	0	4.0-16.0	0-4
GraC:							
Grainola-------------	0-8	17-21	6.6-8.4	0-2	0	0	0
	8-18	21-36	7.9-8.4	0-5	0	0	0
	18-30	21-36	7.9-8.4	0-10	0	0	0
	30-39	21-36	7.9-8.4	0-10	0	0	0
	39-45	---	---	0	0	---	0
GrAD:							
Grainola-------------	0-4	17-21	6.6-8.4	0-2	0	0	0
	4-6	21-36	7.9-8.4	0-5	0	0	0
	6-18	21-36	7.9-8.4	0-10	0	0	0
	18-34	21-36	7.9-8.4	0-10	0	0	0
	34-40	---	---	0	0	---	0
Ashport--------------	0-9	16-21	5.6-8.4	0	0	0	0
	9-14	11-21	6.1-8.4	0-1	0	0	0
	14-32	11-21	6.1-8.4	0-1	0	0	0
	32-55	11-21	6.1-8.4	0-1	0	0	0
	55-79	11-21	6.1-8.4	0-1	0	0	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
GrHC:							
Grant----------------	0-11	10-16	6.1-7.8	0	0	0	0
	11-17	10-16	6.1-7.8	0	0	0	0
	17-28	11-21	6.1-8.4	0-2	0	0	0
	28-38	11-21	6.1-8.4	0-2	0	0	0
	38-45	11-21	6.1-8.4	0-2	0	0	0
	45-52	---	---	0-5	---	---	---
Huska----------------	0-6	8.0-16	5.6-7.8	0	0	0.0-8.0	8-18
	6-12	21-27	6.6-8.4	0-2	0-2	2.0-16.0	15-55
	12-29	21-36	7.4-8.4	0-2	0-2	2.0-16.0	15-55
	29-42	21-36	7.4-8.4	0-2	0-2	2.0-16.0	15-55
	42-44	---	---	---	---	---	---
GrIE:							
Grainola-------------	0-7	17-21	6.6-8.4	0-2	0	0	0
	7-12	21-36	7.9-8.4	0-5	0	0	0
	12-27	21-36	7.9-8.4	0-10	0	0	0
	27-38	21-36	7.9-8.4	0-10	0	0	0
	38-46	---	---	0	0	---	0
Ironmound------------	0-7	7.0-11	5.6-8.4	0	0	0	0
	7-18	10-21	6.1-8.4	0	0	0	0
	18-22	---	---	---	---	---	---
GrPB2:							
Grainola-------------	0-4	10-16	6.6-8.4	0-2	0	0	0
	4-19	21-36	7.9-8.4	0-5	0	0	0
	19-32	21-36	7.9-8.4	0-10	0	0	0
	32-39	21-36	7.9-8.4	0-10	0	0	0
	39-45	---	---	0	0	---	0
Piedmont-------------	0-7	12-16	6.1-7.3	0	0	0	0
	7-16	21-33	6.6-8.4	0-2	0	0	0
	16-33	21-33	7.9-8.4	0-5	0	0	0
	33-39	---	---	---	---	---	---
GrPC2:							
Grainola-------------	0-4	17-21	6.6-8.4	0-2	0	0	0
	4-12	21-36	7.9-8.4	0-5	0	0	0
	12-24	21-36	7.9-8.4	0-10	0	0	0
	24-30	---	---	0	0	---	0
Piedmont-------------	0-7	16-21	6.1-7.3	0	0	0	0
	7-15	21-33	6.6-8.4	0-2	0	0	0
	15-23	21-33	7.9-8.4	0-5	0	0	0
	23-30	---	---	---	---	---	---
GUIE:							
Grainola-------------	0-4	17-21	6.6-8.4	0-2	0	0	0
	4-16	21-36	7.9-8.4	0-10	0	0	0
	16-28	21-36	7.9-8.4	0-10	0	0	0
	28-36	---	---	0	0	---	0
Urban land-----------	0-60	---	---	---	---	---	---
Ironmound------------	0-5	10-15	5.6-8.4	0	0	0	0
	5-12	10-21	6.1-8.4	0	0	0	0
	12-18	---	---	---	---	---	---

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
HarC:							
Harrah---------------	0-6	7.0-11	4.5-7.3	0	0	0	0
	6-13	4.0-11	4.5-7.3	0	0	0	0
	13-19	4.0-11	4.5-7.3	0	0	0	0
	19-33	11-21	4.5-7.3	0	0	0	0
	33-44	11-21	4.5-7.3	0	0	0	0
	44-84	11-21	4.5-7.3	0	0	0	0
HarC2:							
Harrah---------------	0-6	7.0-11	4.5-7.3	0	0	0	0
	6-15	11-21	4.5-7.3	0	0	0	0
	15-27	11-21	4.5-7.3	0	0	0	0
	27-37	11-21	4.5-7.3	0	0	0	0
	37-47	11-21	4.5-7.3	0	0	0	0
	47-76	11-21	4.5-7.3	0	0	0	0
HarC4:							
Harrah---------------	0-5	7.0-11	4.5-7.3	0	0	0	0
	5-8	4.0-11	4.5-7.3	0	0	0	0
	8-11	11-21	4.5-7.3	0	0	0	0
	11-38	11-21	4.5-7.3	0	0	0	0
	38-65	11-21	4.5-7.3	0	0	0	0
	65-80	11-21	4.5-7.3	0	0	0	0
HarG:							
Harrah---------------	0-8	7.0-11	4.5-7.3	0	0	0	0
	8-13	4.0-11	4.5-7.3	0	0	0	0
	13-25	11-21	4.5-7.3	0	0	0	0
	25-35	11-21	4.5-7.3	0	0	0	0
	35-43	11-21	4.5-7.3	0	0	0	0
	43-84	11-21	4.5-7.3	0	0	0	0
HaUC:							
Harrah---------------	0-6	7.0-11	4.5-7.3	0	0	0	0
	6-8	4.0-11	4.5-7.3	0	0	0	0
	8-18	11-21	4.5-7.3	0	0	0	0
	18-37	11-21	4.5-7.3	0	0	0	0
	37-52	11-21	4.5-7.3	0	0	0	0
	52-84	11-21	4.5-7.3	0	0	0	0
Urban land-----------	0-60	---	---	---	---	---	---
HiLA:							
Hibsaw---------------	0-8	9.0-14	7.4-8.4	0	0	4.0-16.0	20-40
	8-18	11-21	7.9-9.0	1-5	0	4.0-16.0	20-40
	18-30	16-21	7.9-9.0	1-5	0	4.0-16.0	20-40
	30-74	7.0-24	7.9-9.0	1-5	0	2.0-8.0	20-30
	74-96	11-21	7.9-8.4	1-5	0	2.0-8.0	20-30
Lomill---------------	0-7	16-23	7.4-8.4	0	0	0	0
	7-25	21-35	7.9-8.4	0	0	0	0
	25-31	21-35	7.9-8.4	0	0	0	0
	31-84	6.0-20	7.9-8.4	0	0	0	0
IrCE:							
Ironmound------------	0-8	7.0-11	5.6-8.4	0	0	0	0
	8-14	10-21	6.1-8.4	0	0	0	0
	14-20	---	---	---	---	---	---

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
IrCE:							
Coyle----------------	0-9	10-16	5.6-7.8	0	0	0	0
	9-12	11-16	5.6-7.8	0	0	0	0
	12-23	13-21	5.6-7.8	0	0	0	0
	23-27	11-21	5.6-7.8	0	0	0	0
	27-30	---	---	---	---	---	---
IrKD:							
Ironmound------------	0-3	10-15	5.6-8.4	0	0	0	0
	3-13	10-21	6.1-8.4	0	0	0	0
	13-21	---	---	---	---	---	---
Kingfisher-----------	0-10	9.0-16	6.1-7.8	0	0	0	0
	10-21	16-21	6.6-8.4	0	0	0	0
	21-38	16-24	6.6-8.4	0	0	0	0
	38-49	---	---	---	---	---	---
KekA:							
Keokuk---------------	0-8	7.0-11	6.1-8.4	0	0	0	0
	8-12	7.0-11	6.1-8.4	0	0	0	0
	12-20	7.0-11	6.1-8.4	0-1	0	0	0
	20-84	4.0-11	7.4-8.4	0-2	0	0	0
KeoA:							
Keokuk---------------	0-11	7.0-11	6.1-8.4	0	0	0	0
	11-25	7.0-11	6.1-8.4	0-1	0	0	0
	25-96	4.0-11	7.4-8.4	0-2	0	0	0
KeUA:							
Keokuk---------------	0-16	7.0-11	6.1-8.4	0	0	0	0
	16-42	7.0-11	6.1-8.4	0-1	0	0	0
	42-80	4.0-11	7.4-8.4	0-2	0	0	0
Urban land-----------	0-60	---	---	---	---	---	---
KgIC:							
Kingfisher-----------	0-11	9.0-16	6.1-7.8	0	0	0	0
	11-13	15-21	6.1-7.8	0	0	0	0
	13-25	16-21	6.6-8.4	0	0	0	0
	25-28	---	---	---	---	---	---
Ironmound------------	0-6	10-15	5.6-8.4	0	0	0	0
	6-14	10-21	6.1-8.4	0	0	0	0
	14-18	---	---	---	---	---	---
KowB:							
Konawa---------------	0-5	6.0-11	5.1-6.5	0	0	0	0
	5-17	2.0-10	5.1-6.5	0	0	0	0
	17-34	11-18	5.1-7.3	0	0	0	0
	34-58	11-18	5.1-7.3	0	0	0	0
	58-84	5.0-18	5.1-6.5	0	0	0	0
KowD:							
Konawa---------------	0-8	6.0-11	5.1-6.5	0	0	0	0
	8-11	2.0-10	5.1-6.5	0	0	0	0
	11-28	11-18	5.1-7.3	0	0	0	0
	28-38	11-18	5.1-7.3	0	0	0	0
	38-52	11-18	5.1-7.3	0	0	0	0
	52-80	5.0-18	5.1-6.5	0	0	0	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
KowD2:							
Konawa---------------	0-7	6.0-11	5.1-6.5	0	0	0	0
	7-18	11-18	5.1-7.3	0	0	0	0
	18-37	11-18	5.1-7.3	0	0	0	0
	37-80	5.0-18	5.1-6.5	0	0	0	0
KowD4:							
Konawa---------------	0-10	6.0-11	5.1-6.5	0	0	0	0
	10-13	2.0-10	5.1-6.5	0	0	0	0
	13-35	11-18	5.1-7.3	0	0	0	0
	35-53	11-18	5.1-7.3	0	0	0	0
	53-65	11-18	5.1-7.3	0	0	0	0
	65-80	11-18	5.1-7.3	0	0	0	0
KrdA:							
Kirkland-------------	0-10	10-16	5.6-7.3	0	0	0.0-2.0	1-4
	10-22	24-36	6.6-8.4	0-2	0	0.0-2.0	2-12
	22-37	24-36	6.6-8.4	0-2	0	0.0-2.0	2-12
	37-63	24-36	6.6-8.4	0-2	0	0.0-2.0	2-12
	63-82	21-36	7.4-8.4	0-2	0-2	2.0-4.0	3-16
KrUA:							
Kirkland-------------	0-11	10-16	5.6-7.3	0	0	0.0-2.0	1-4
	11-28	24-36	6.6-8.4	0-2	0	0.0-2.0	2-12
	28-48	21-36	7.4-8.4	0-2	0-2	2.0-4.0	3-16
	48-76	21-36	7.4-8.4	0-2	0-2	2.0-4.0	3-16
	76-84	---	---	---	---	---	---
Urban land-----------	0-60	---	---	---	---	---	---
KUIC:							
Kingfisher-----------	0-11	9.0-16	6.1-7.8	0	0	0	0
	11-13	15-21	6.1-7.8	0	0	0	0
	13-25	16-21	6.6-8.4	0	0	0	0
	25-28	---	---	---	---	---	---
Urban land-----------	0-60	---	---	---	---	---	---
Ironmound------------	0-6	10-15	5.6-8.4	0	0	0	0
	6-14	10-21	6.1-8.4	0	0	0	0
	14-18	---	---	---	---	---	---
KwUD:							
Konawa---------------	0-7	6.0-11	5.1-6.5	0	0	0	0
	7-10	2.0-10	5.1-6.5	0	0	0	0
	10-25	11-18	5.1-7.3	0	0	0	0
	25-49	11-18	5.1-7.3	0	0	0	0
	49-80	5.0-18	5.1-6.5	0	0	0	0
Urban land-----------	0-60	---	---	---	---	---	---
LarA:							
Lawrie---------------	0-9	10-16	6.1-7.8	0	0	0	0
	9-24	10-16	6.1-7.8	0	0	0	0
	24-40	11-21	6.1-8.4	0	0	0	0
	40-67	11-21	6.1-8.4	0	0	0	0
	67-87	11-21	6.1-8.4	0-2	0	0	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
LatG:							
Latrass---------------	0-5	10-16	7.4-8.4	0	0	0	0
	5-22	21-36	7.4-8.4	0	0	0	0
	22-42	21-36	7.4-8.4	0	0	0	0
	42-80	---	---	---	---	---	---
LawA:							
Lawrie---------------	0-9	10-16	6.1-7.8	0	0	0	0
	9-13	10-16	6.1-7.8	0	0	0	0
	13-18	11-21	6.1-8.4	0	0	0	0
	18-47	11-21	6.1-8.4	0-2	0	0	0
	47-59	11-21	6.1-8.4	0-2	0	0	0
	59-82	17-24	7.9-8.4	0-2	0	0	0
LitB:							
Littleaxe------------	0-5	6.0-12	5.1-7.3	0	0	0	0
	5-9	2.0-8.0	4.5-6.5	0	0	0	0
	9-17	3.0-8.0	4.5-6.5	0	0	0	0
	17-36	3.0-8.0	4.5-6.5	0	0	0	0
	36-43	9.0-18	4.5-7.3	0	0	0	0
	43-45	---	---	---	---	---	---
LitC:							
Littleaxe------------	0-6	6.0-12	5.1-7.3	0	0	0	0
	6-8	2.0-8.0	4.5-6.5	0	0	0	0
	8-33	3.0-8.0	4.5-6.5	0	0	0	0
	33-52	3.0-8.0	4.5-6.5	0	0	0	0
	52-59	9.0-18	4.5-7.3	0	0	0	0
	59-72	---	---	---	---	---	---
LitC2:							
Littleaxe------------	0-9	6.0-12	5.1-7.3	0	0	0	0
	9-21	3.0-8.0	4.5-6.5	0	0	0	0
	21-32	3.0-8.0	4.5-6.5	0	0	0	0
	32-45	9.0-18	4.5-7.3	0	0	0	0
	45-50	---	---	---	---	---	---
LomA:							
Lomill---------------	0-4	16-23	7.4-8.4	0	0	0	0
	4-12	21-35	7.9-8.4	0	0	0	0
	12-27	21-35	7.9-8.4	0	0	0	0
	27-48	6.0-20	7.9-8.4	0	0	0	0
	48-72	6.0-20	7.9-8.4	0	0	0	0
LtUC:							
Littleaxe------------	0-6	6.0-12	5.1-7.3	0	0	0	0
	6-11	2.0-8.0	4.5-6.5	0	0	0	0
	11-25	3.0-8.0	4.5-6.5	0	0	0	0
	25-32	3.0-8.0	4.5-6.5	0	0	0	0
	32-44	9.0-18	4.5-7.3	0	0	0	0
	44-50	---	---	---	---	---	---
Urban land-----------	0-60	---	---	---	---	---	---
LweA:							
Lawrie---------------	0-11	17-24	6.1-7.8	0	0	0	0
	11-21	11-21	6.1-8.4	0	0	0	0
	21-34	11-21	6.1-8.4	0	0	0	0
	34-55	11-21	6.1-8.4	0-2	0	0	0
	55-80	11-21	6.1-8.4	0-2	0	0	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
LwfA:							
Lawrie---------------	0-14	7.0-11	6.1-7.8	0	0	0	0
	14-33	11-21	6.1-7.8	0	0	0	0
	33-57	11-21	6.1-8.4	0-2	0	0	0
	57-70	11-21	6.1-8.4	0-2	0	0	0
	70-96	17-24	7.9-8.4	0-2	0	0	0
LwUA:							
Lawrie---------------	0-9	10-16	6.1-7.8	0	0	0	0
	9-17	11-21	6.1-8.4	0	0	0	0
	17-24	11-21	6.1-8.4	0	0	0	0
	24-33	11-21	6.1-8.4	0-2	0	0	0
	33-45	11-21	6.1-8.4	0-2	0	0	0
	45-84	17-24	7.9-8.4	0-2	0	0	0
Urban land-----------	0-60	---	---	---	---	---	---
MlfA:							
Miller---------------	0-19	7.0-11	6.6-7.8	0	0	0	0
	19-29	24-36	7.4-8.4	0	0	0	0
	29-37	24-36	7.4-8.4	0	0	0	0
	37-96	21-36	7.9-8.4	0-2	0-2	0	0
MllA:							
Miller---------------	0-7	24-35	7.4-8.4	0	0	0	0
	7-12	24-35	7.4-8.4	0	0	0	0
	12-24	21-36	7.4-8.4	0	0	0	0
	24-70	21-36	7.4-8.4	0-2	0-2	0	0
	70-84	21-36	7.4-8.4	0-2	0-2	0	0
M-W:							
Miscellaneous water.							
NewB:							
Newalla--------------	0-4	5.0-11	4.5-7.3	0	0	0	0
	4-8	5.0-11	4.5-7.3	0	0	0	0
	8-16	12-21	4.5-7.3	0	0	0	0
	16-32	24-36	4.5-8.4	0-2	0	0	0-4
	32-42	24-36	7.4-8.4	0-2	0	0	0-8
	42-48	---	---	---	---	---	---
NewC2:							
Newalla--------------	0-6	5.0-11	4.5-7.3	0	0	0	0
	6-10	12-21	4.5-7.3	0	0	0	0
	10-38	24-36	4.5-8.4	0-2	0	0	0-4
	38-55	24-36	4.5-8.4	0-2	0	0	0-4
	55-60	---	---	---	---	---	---
NorB:							
Norge----------------	0-12	10-16	5.6-7.3	0	0	0	0
	12-18	11-21	5.6-7.3	0	0	0	0
	18-27	17-21	5.6-7.8	0	0	0	0
	27-43	17-21	5.6-7.8	0	0	0	0
	43-86	17-30	6.1-8.4	0-2	0	0	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
NorC:							
Norge----------------	0-9	10-16	5.6-7.3	0	0	0	0
	9-14	11-21	5.6-7.3	0	0	0	0
	14-39	17-21	5.6-7.8	0	0	0	0
	39-68	17-21	5.6-7.8	0	0	0	0
	68-88	17-30	6.1-8.4	0-2	0	0	0
NorC2:							
Norge----------------	0-10	10-16	5.6-7.3	0	0	0	0
	10-30	17-21	5.6-7.8	0	0	0	0
	30-49	17-21	5.6-7.8	0	0	0	0
	49-63	17-21	5.6-7.8	0	0	0	0
	63-84	17-30	6.1-8.4	0-2	0	0	0
NoUC:							
Norge----------------	0-9	10-16	5.6-7.3	0	0	0	0
	9-16	11-21	5.6-7.3	0	0	0	0
	16-46	11-21	5.6-7.3	0	0	0	0
	46-68	17-21	5.6-7.8	0	0	0	0
	68-84	17-30	6.1-8.4	0-2	0	0	0
Urban land-----------	0-60	---	---	---	---	---	---
PdHC:							
Piedmont-------------	0-7	12-16	6.1-7.3	0	0	0	0
	7-10	19-24	6.1-7.8	0	0	0	0
	10-15	21-33	6.6-8.4	0-2	0	0	0
	15-25	21-33	7.9-8.4	0-5	0	0	0
	25-37	21-33	7.9-8.4	0-5	0	0	0
	37-45	---	---	---	---	---	---
Huska----------------	0-3	8.0-16	5.6-7.8	0	0	0.0-8.0	8-18
	3-18	21-27	6.6-8.4	0-2	0-2	2.0-16.0	15-55
	18-40	21-36	7.4-8.4	0-2	0-2	2.0-16.0	15-55
	40-45	---	---	---	---	---	---
PieC2:							
Piedmont-------------	0-4	16-21	6.1-7.3	0	0	0	0
	4-20	21-33	6.6-8.4	0-2	0	0	0
	20-32	21-33	7.9-8.4	0-5	0	0	0
	32-40	---	---	---	---	---	---
PimB:							
Piedmont-------------	0-4	12-16	6.1-7.3	0	0	0	0
	4-8	19-24	6.1-7.8	0	0	0	0
	8-16	21-33	6.6-8.4	0-2	0	0	0
	16-30	21-33	7.9-8.4	0-5	0	0	0
	30-36	21-33	7.9-8.4	0-5	0	0	0
	36-48	---	---	---	---	---	---
PimC:							
Piedmont-------------	0-4	12-16	6.1-7.3	0	0	0	0
	4-6	19-24	6.1-7.8	0	0	0	0
	6-23	21-33	6.6-8.4	0-2	0	0	0
	23-31	21-33	7.9-8.4	0-5	0	0	0
	31-40	---	---	---	---	---	---
PIT:							
Pits-----------------	0-60	---	---	---	---	---	---

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
PukA:							
Pulaski--------------	0-9	7.0-11	5.6-7.3	0	0	0	0
	9-14	7.0-11	5.6-7.3	0	0	0	0
	14-55	7.0-11	5.6-7.3	0	0	0	0
	55-79	4.0-11	5.6-8.4	0	0	0	0
PulA:							
Pulaski--------------	0-5	7.0-11	5.6-7.3	0	0	0	0
	5-17	7.0-11	5.6-7.3	0	0	0	0
	17-34	7.0-11	5.6-7.3	0	0	0	0
	34-72	4.0-11	5.6-8.4	0	0	0	0
RenB:							
Renfrow--------------	0-8	11-16	6.1-7.8	0	0	0	0
	8-15	14-24	6.1-7.8	0	0	0	0
	15-41	21-33	6.1-8.4	0	0	0.0-2.0	0-4
	41-68	21-33	6.1-8.4	0	0	0.0-2.0	0-4
	68-99	21-33	6.1-8.4	0	0	0.0-2.0	0-4
RinB:							
Renthin--------------	0-4	15-35	6.1-7.3	0	0	0	0
	4-10	20-30	6.1-7.8	0	0	0	0
	10-29	20-40	6.6-8.4	0-2	0	0	0
	29-55	20-40	7.9-8.4	0-5	0	0	0
	55-77	---	---	---	---	---	---
RnnB:							
Renthin--------------	0-10	20-25	6.1-7.3	0	0	0	0
	10-16	20-30	6.1-7.8	0	0	0	0
	16-26	20-40	6.6-8.4	0-2	0	0	0
	26-34	20-40	6.6-8.4	0-2	0	0	0
	34-44	20-40	7.9-8.4	0-5	0	0	0
	44-50	---	---	---	---	---	---
RnnC2:							
Renthin--------------	0-8	20-25	6.1-7.3	0	0	0	0
	8-12	20-30	6.1-7.8	0	0	0	0
	12-19	20-40	6.6-8.4	0-2	0	0	0
	19-55	20-40	7.9-8.4	0-5	0	0	0
	55-60	---	---	---	---	---	---
RnUC:							
Renthin--------------	0-10	15-35	6.1-7.3	0	0	0	0
	10-14	20-30	6.1-7.8	0	0	0	0
	14-51	20-40	6.6-8.4	0-2	0	0	0
	51-58	20-40	7.9-8.4	0-5	0	0	0
	58-72	---	---	---	---	---	---
Urban land-----------	0-60	---	---	---	---	---	---
SDGD4:							
Stephenville---------	0-4	7.0-12	5.1-6.5	0	0	0	0
	4-20	11-21	4.5-6.0	0	0	0	0
	20-30	11-21	4.5-6.0	0	0	0	0
	30-40	---	---	---	---	---	---
Darsil---------------	0-6	1.0-6.0	5.1-7.8	0	0	0	0
	6-10	1.0-6.0	5.1-7.8	0	0	0	0
	10-15	---	---	---	---	---	---

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
SDGD4:							
Gullied land----------	0-60	---	---	---	---	---	---
SDND:							
Stephenville----------	0-3	7.0-12	5.1-6.5	0	0	0	0
	3-10	4.0-10	5.1-6.5	0	0	0	0
	10-21	11-21	4.5-6.0	0	0	0	0
	21-24	---	---	---	---	---	---
Darsil----------------	0-5	1.0-6.0	5.1-7.8	0	0	0	0
	5-16	1.0-6.0	5.1-7.8	0	0	0	0
	16-18	---	---	---	---	---	---
Newalla---------------	0-3	5.0-11	4.5-7.3	0	0	0	0
	3-10	5.0-11	4.5-7.3	0	0	0	0
	10-15	12-21	4.5-7.3	0	0	0	0
	15-30	24-36	4.5-8.4	0-2	0	0	0-4
	30-41	24-36	4.5-8.4	0-2	0	0	0-4
	41-45	---	---	---	---	---	---
SDND2:							
Stephenville----------	0-4	7.0-12	5.1-6.5	0	0	0	0
	4-17	11-21	4.5-6.0	0	0	0	0
	17-24	11-21	4.5-6.0	0	0	0	0
	24-29	11-21	4.5-6.0	0	0	0	0
	29-31	---	---	---	---	---	---
Darsil----------------	0-6	1.0-6.0	5.1-7.8	0	0	0	0
	6-14	1.0-6.0	5.1-7.8	0	0	0	0
	14-16	---	---	---	---	---	---
Newalla---------------	0-6	5.0-11	4.5-7.3	0	0	0	0
	6-14	12-21	4.5-7.3	0	0	0	0
	14-44	24-36	4.5-8.4	0-2	0	0	0-4
	44-50	24-36	7.4-8.4	0-2	0	0	0-8
	50-55	---	---	---	---	---	---
StDC:							
Stephenville----------	0-5	7.0-12	5.1-6.5	0	0	0	0
	5-8	4.0-10	5.1-6.5	0	0	0	0
	8-20	11-21	4.5-6.0	0	0	0	0
	20-27	11-21	4.5-6.0	0	0	0	0
	27-32	---	---	---	---	---	---
Darsil----------------	0-4	1.0-6.0	5.1-7.8	0	0	0	0
	4-16	1.0-6.0	5.1-7.8	0	0	0	0
	16-24	---	---	---	---	---	---
StDC2:							
Stephenville----------	0-3	7.0-12	5.1-6.5	0	0	0	0
	3-6	11-21	4.5-6.0	0	0	0	0
	6-17	11-21	4.5-6.0	0	0	0	0
	17-26	11-21	4.5-6.0	0	0	0	0
	26-42	---	---	---	---	---	---
Darsil----------------	0-4	1.0-6.0	5.1-7.8	0	0	0	0
	4-15	1.0-6.0	5.1-7.8	0	0	0	0
	15-20	---	---	---	---	---	---

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
StLC4:							
Stephenville---------	0-6	7.0-12	5.1-6.5	0	0	0	0
	6-20	11-21	4.5-6.0	0	0	0	0
	20-30	11-21	4.5-6.0	0	0	0	0
	30-40	---	---	---	---	---	---
Littleaxe------------	0-10	6.0-12	5.1-7.3	0	0	0	0
	10-24	3.0-8.0	4.5-6.5	0	0	0	0
	24-42	3.0-8.0	4.5-6.5	0	0	0	0
	42-52	9.0-18	4.5-7.3	0	0	0	0
	52-56	---	---	---	---	---	---
SUND:							
Stephenville---------	0-5	7.0-12	5.1-6.5	0	0	0	0
	5-9	4.0-10	5.1-6.5	0	0	0	0
	9-22	11-21	4.5-6.0	0	0	0	0
	22-28	11-21	4.5-6.0	0	0	0	0
	28-35	---	---	---	---	---	---
Urban land-----------	0-60	---	---	---	---	---	---
Newalla--------------	0-6	7.0-15	4.5-7.3	0	0	0	0
	6-11	12-21	4.5-7.3	0	0	0	0
	11-34	24-36	4.5-8.4	0-2	0	0	0-4
	34-58	24-36	4.5-8.4	0-2	0	0	0-4
	58-72	---	---	---	---	---	---
TevD:							
Teval----------------	0-7	9.0-16	5.6-7.3	0	0	0	0
	7-11	11-18	5.6-7.8	0	0	0	0
	11-20	11-21	6.1-8.4	0	0	0	0
	20-38	11-21	6.1-8.4	0	0	0	0
	38-50	3.0-18	7.4-8.4	0-20	0	0	0
	50-96	2.0-12	7.4-8.4	0-20	0	0	0
TevD2:							
Teval----------------	0-5	9.0-16	5.6-7.3	0	0	0	0
	5-9	11-18	5.6-7.8	0	0	0	0
	9-21	11-21	6.1-8.4	0	0	0	0
	21-51	3.0-18	7.4-8.4	0-20	0	0	0
	51-72	2.0-12	7.4-8.4	0-20	0	0	0
TlrB:							
Teller---------------	0-10	7.0-11	5.6-7.3	0	0	0	0
	10-18	11-18	5.6-7.3	0	0	0	0
	18-29	11-18	5.6-7.3	0	0	0	0
	29-38	11-18	5.6-7.3	0	0	0	0
	38-47	11-18	5.6-7.3	0	0	0	0
	47-84	7.0-13	5.6-8.4	0	0	0	0
TlrC:							
Teller---------------	0-12	7.0-11	5.6-7.3	0	0	0	0
	12-17	11-18	5.6-7.3	0	0	0	0
	17-33	11-18	5.6-7.3	0	0	0	0
	33-46	11-18	5.6-7.3	0	0	0	0
	46-57	11-18	5.6-7.3	0	0	0	0
	57-79	7.0-13	5.6-8.4	0	0	0	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
TlrC2:							
Teller---------------	0-10	7.0-11	5.6-7.3	0	0	0	0
	10-17	11-18	5.6-7.3	0	0	0	0
	17-33	11-18	5.6-7.3	0	0	0	0
	33-50	11-18	5.6-7.3	0	0	0	0
	50-74	11-18	5.6-7.3	0	0	0	0
	74-84	7.0-13	5.6-8.4	0	0	0	0
TlrD:							
Teller---------------	0-12	7.0-11	5.6-7.3	0	0	0	0
	12-17	11-18	5.6-7.3	0	0	0	0
	17-30	11-18	5.6-7.3	0	0	0	0
	30-48	11-18	5.6-7.3	0	0	0	0
	48-60	11-18	5.6-7.3	0	0	0	0
	60-79	7.0-13	5.6-8.4	0	0	0	0
TlUD:							
Teller---------------	0-11	7.0-11	5.6-7.3	0	0	0	0
	11-17	7.0-13	5.6-8.4	0	0	0	0
	17-27	11-18	5.6-7.3	0	0	0	0
	27-43	11-18	5.6-7.3	0	0	0	0
	43-58	7.0-13	5.6-8.4	0	0	0	0
	58-74	7.0-13	5.6-8.4	0	0	0	0
Urban land-----------	0-79	---	---	---	---	---	---
TriA:							
Tribbey--------------	0-8	7.0-11	5.6-8.4	0	0	0	0
	8-15	7.0-11	5.6-8.4	0	0	0	0
	15-62	4.0-11	5.6-8.4	0	0	0	0
	62-80	10-18	6.6-8.4	0	0	0	0
URB:							
Urban land-----------	0-80	---	---	---	---	---	---
VanA:							
Vanoss---------------	0-8	10-16	5.1-7.3	0	0	0	0
	8-14	11-18	5.1-7.3	0	0	0	0
	14-30	17-21	5.1-7.3	0	0	0	0
	30-39	17-21	5.1-7.3	0	0	0	0
	39-59	11-21	5.6-7.8	0	0	0	0
	59-76	11-21	4.5-7.3	0	0	0	0
VanB:							
Vanoss---------------	0-8	10-16	5.1-7.3	0	0	0	0
	8-14	11-18	5.1-7.3	0	0	0	0
	14-19	11-18	5.1-7.3	0	0	0	0
	19-33	17-21	5.1-7.3	0	0	0	0
	33-52	7.0-21	5.6-7.8	0	0	0	0
	52-80	11-21	4.5-7.3	0	0	0	0
W:							
Water.							
WauA:							
Waurika--------------	0-10	9.0-15	5.6-7.3	0	0	0.0-2.0	0-4
	10-13	9.0-15	5.6-7.3	0	0	0.0-2.0	4-10
	13-38	24-35	6.1-8.4	0	0	0.0-4.0	4-10
	38-69	18-29	7.4-8.4	0	0	0.0-8.0	8-20
	69-84	16-35	7.4-8.4	0	0	0.0-8.0	8-20

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
WtgA:							
Watonga--------------	0-9	24-35	6.6-8.4	0-2	0	0	0
	9-25	24-35	6.6-8.4	2-5	0	0	0
	25-42	21-35	7.4-8.4	2-10	0	0	0
	42-80	21-35	7.4-8.4	5-15	0	0	0
WuUA:							
Watonga--------------	0-13	24-35	6.6-8.4	0-2	0	0	0
	13-34	24-35	6.6-8.4	2-5	0	0	0
	34-54	21-35	7.4-8.4	2-10	0	0	0
	54-80	21-35	7.4-8.4	5-15	0	0	0
Urban land-----------	0-80	---	---	---	---	---	---
YaGA:							
Yahola---------------	0-10	7.0-11	7.4-8.4	0-1	0	0	0
	10-24	4.0-11	7.9-8.4	1-5	0	0	0
	24-42	4.0-11	7.9-8.4	1-5	0	0	0
	42-79	4.0-11	7.9-8.4	1-5	0	0	0
Gaddy----------------	0-8	7.0-12	7.4-8.4	0-2	0	0	0
	8-21	4.0-10	7.9-8.4	1-5	0	0	0
	21-80	4.0-10	7.9-8.4	1-5	0	0	0
YahA:							
Yahola---------------	0-6	7.0-11	7.4-8.4	0-1	0	0	0
	6-11	4.0-11	7.9-8.4	1-5	0	0	0
	11-71	4.0-11	7.9-8.4	1-5	0	0	0
	71-96	4.0-11	7.9-8.4	1-5	0	0	0
YaUA:							
Yahola---------------	0-4	7.0-11	7.4-8.4	0-1	0	0	0
	4-22	4.0-11	7.9-8.4	1-5	0	0	0
	22-48	4.0-11	7.9-8.4	1-5	0	0	0
	48-80	4.0-11	7.9-8.4	1-5	0	0	0
Urban land-----------	0-80	---	---	---	---	---	---
ZanB:							
Zaneis---------------	0-9	10-16	5.6-7.3	0	0	0	0
	9-14	11-18	5.6-7.3	0	0	0	0
	14-35	13-23	5.6-7.3	0	0	0	0
	35-54	13-23	5.6-7.3	0	0	0	0
	54-59	11-18	6.1-7.8	0	0	0	0
	59-72	---	---	---	---	---	---
ZanC:							
Zaneis---------------	0-12	10-16	5.6-7.3	0	0	0	0
	12-19	11-18	5.6-7.3	0	0	0	0
	19-31	13-23	5.6-7.3	0	0	0	0
	31-48	13-23	5.6-7.3	0	0	0	0
	48-59	11-18	6.1-7.8	0	0	0	0
	59-65	---	---	---	---	---	---

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
ZanC2:							
Zaneis---------------	0-12	10-16	5.6-7.3	0	0	0	0
	12-30	11-18	5.6-7.3	0	0	0	0
	30-40	13-23	5.6-7.3	0	0	0	0
	40-47	11-18	6.1-7.8	0	0	0	0
	47-55	11-18	6.1-7.8	0	0	0	0
	55-65	---	---	---	---	---	---
ZaUC:							
Zaneis---------------	0-10	10-16	5.6-7.3	0	0	0	0
	10-16	11-18	5.6-7.3	0	0	0	0
	16-23	13-23	5.6-7.3	0	0	0	0
	23-32	13-23	5.6-7.3	0	0	0	0
	32-42	13-23	5.6-7.3	0	0	0	0
	42-50	---	---	---	---	---	---
Urban land-----------	0-60	---	---	---	---	---	---

Chemical Analyses of Selected Soils

The results of chemical analysis of several pedons are given in the table “Chemical Properties of Selected Soils” in this section. The data are for soils sampled at carefully selected sites. The pedons are typical of the series described in Part I of this survey. Soil samples were analyzed by the Soil Survey Laboratory, Lincoln, Nebraska.

The determinations were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods.

Organic carbon—wet combustion. Walkley-Black modified acid-dichromate, ferric sulfate titration (6A1c).

Extractable cations—ammonium acetate pH 7.0, atomic absorption; calcium (6N2e), magnesium (6O2d), sodium (6P2b), potassium (6Q2b).

Extractable acidity—barium chloride-triethanolamine IV (6H5a).

Cation-exchange capacity—sum of cations (5A3a).

Cation-exchange capacity—ammonium acetate, pH 7.0, steam distillation (5A8b).

Base saturation—sum of cations, TEA, pH 8.2 (5C3).

Base saturation—ammonium acetate, pH 7.0 (5C1).

Reaction (pH)—calcium chloride (8C1f).

Reaction (pH)—1:1 water dilution (8C1f).

Chemical Properties of Selected Soils

(TR means trace.)

Soil name and sample number*	Depth	Horizon	Organic carbon	Extractable bases (ammonium acetate) Ca	Mg	Na	K	Extract- able acidity	Cation-exchange capacity Sum of cations	Ammonium acetate	Base saturation Sum of cations	Ammonium acetate	pH $CaCl_2$ 1:2	H_2O 1:1
	In		*Pct*	-------*Milliequivalents per 100 grams of soil*-------							*Pct*	*Pct*		
Bethany	0-6	A1	2.22	9.6	2.5	TR	0.6	5.4	18.1	14.0	70	91	5.5	6.2
S91OK-109-	6-13	A2	1.37	9.4	3.1	0.1	0.4	4.6	17.6	14.2	74	92	5.5	6.1
006	13-18	BA	1.02	10.7	4.6	0.2	0.4	5.8	21.7	17.4	73	91	5.4	6.2
	18-32	Btb1	0.63	15.5	8.4	1.1	0.4	4.7	30.1	27.4	84	93	6.0	6.8
	32-40	Btb21	0.39	---	8.8	1.8	0.4	2.0	---	25.5	---	100	7.4	8.2
	40-51	Btkb1	0.33	---	8.5	2.9	0.3	---	---	22.8	100	100	7.5	7.9
	51-59	Btkb2	0.09	16.0	7.9	3.4	0.4	---	27.7	20.5	100	100	7.3	7.7
	59-69	B'tb1	0.05	13.2	6.8	3.1	0.4	1.8	25.3	19.7	93	100	7.2	7.6
	69-84	B'tb2	0.04	11.6	5.7	2.5	0.3	2.1	22.2	18.2	91	100	7.1	7.5
	84-95	Btb3	0.03	10.4	4.4	1.7	0.2	1.1	17.8	15.8	94	100	7.1	7.6
	95-114	Btb4	0.02	9.9	4.0	1.5	0.3	1.3	17.0	15.2	92	100	7.0	7.9
Canadian	0-8	Ap	0.71	5.2	1.2	---	0.3	3.1	9.8	8.6	68	78	4.5	4.9
S93OK-109-	8-19	A	0.57	6.7	1.4	---	0.3	3.0	11.4	10.1	74	83	4.8	5.3
002	19-30	Bw	0.42	8.7	1.5	TR	0.2	1.0	11.4	11.0	91	95	6.0	6.6
	30-65	C	0.21	---	1.0	TR	0.1	---	---	5.6	100	100	7.7	8.2
Doolin	0-8	Ap	1.18	11.8	7.1	20.0	0.2	6.4	45.5	21.4	86	100	5.2	5.5
S92OK-109-	8-15	Bt1	0.73	13.4	14.1	2.1	0.5	---	30.1	36.6	100	82	5.9	6.6
004	15-23	Bt21	0.70	18.4	12.6	0.1	0.4	4.1	37.5	34.2	89	98	6.3	7.1
	23-35	Btk1	0.37	---	13.6	0.1	0.1	---	---	32.3	100	100	7.6	8.1
	35-46	Btk2	0.19	---	14.2	0.1	0.2	---	---	31.8	100	100	7.6	7.7
	46-56	Btky	0.09	---	12.5	TR	0.3	---	---	27.7	100	100	7.6	7.7
	56-72	Cr	0.08	---	12.3	---	0.6	1.1	---	27.9	---	100	7.4	7.6
Hibsaw	0-8	Ap	1.07	5.3	7.9	11.1	0.4	0.7	25.4	16.9	97	100	7.8	8.1
S93OK-109-	8-18	Bw	0.31	---	7.5	10.2	0.4	---	---	13.4	100	100	8.2	8.6
001	18-30	Ck	0.30	---	9.9	9.6	0.3	---	---	16.9	100	100	8.2	8.7
	30-55	C1	0.14	---	5.4	5.1	0.1	---	---	8.3	100	100	8.2	8.8
	55-74	C2	0.40	---	13.6	11.2	0.4	3.9	---	25.9	---	100	8.0	8.5
	74-96	Ab	0.26	---	11.5	9.3	0.2	---		18.3	100	100	8.0	8.4
Huska	0-3	Ap	1.11	5.3	2.9	0.3	0.2	5.1	13.8	11.2	63	78	4.8	5.5
S92OK-109-	3-7	Bt1	0.94	13.1	10.3	1.7	0.1	7.0	32.2	28.7	78	88	5.6	6.7
001	7-11	Bt2	0.66	13.7	11.3	2.2	0.2	6.2	33.6	29.2	82	94	6.3	7.2
	11-18	Btk	0.57	13.1	11.0	2.5	0.3	3.8	30.7	27.8	88	97	6.6	7.5
	18-28	Btkn	0.33	---	10.0	4.4	---	---	---	21.3	100	100	7.8	8.4
	28-38	Btn	0.08	---	7.9	5.8	---	---	---	15.3	100	100	7.6	7.7
	38-45	Cr	0.05	9.2	6.5	5.1	---	0.5	21.3	14.2	98	100	7.8	8.0
Kirkland	0-10	A1	1.01	10.2	2.2	0.1	0.4	2.1	15.0	13.5	86	96	5.9	6.8
S88OK-109-	10-12	A2	0.73	11.0	4.0	0.5	0.3	3.5	19.3	16.6	82	95	5.9	6.9
003	12-24	Bt1	0.63	19.0	10.0	2.0	0.5	3.9	35.4	33.0	89	95	6.3	7.5
	24-33	Bt2	0.40	---	10.1	3.3	0.4	---	---	29.4	100	100	7.6	8.4
	33-44	Btky1	0.27	---	10.1	4.8	0.4	---	---	28.2	100	100	7.8	7.9
	44-63	Btky2	0.17	---	9.5	5.7	0.4	---	---	27.3	100	100	7.7	7.8
	63-72	Btk1	0.10	---	9.1	5.7	0.4	---	---	29.1	100	100	7.6	8.0
	72-87	Btk2	0.03	13.8	6.4	3.9	0.4	---	24.5	22.6	100	100	7.6	8.1
	87-102	2C	TR	---	5.3	3.0	0.3	---	---	16.9	100	100	7.9	8.5
Kirkland	0-10	Ap	1.16	6.9	3.2	0.4	0.2	4.5	15.2	12.6	70	85	5.2	6.1
S93OK-109-	10-22	Bt1	0.68	14.1	10.4	1.8	0.5	3.1	29.9	27.4	90	98	6.4	7.4
003	22-37	Bt2	0.44	13.2	10.6	2.8	0.6	1.8	29.0	25.2	94	100	7.3	8.2
	37-53	Btk1	0.24	---	10.3	3.7	0.4	---	---	22.0	100	100	7.8	8.4
	53-81	Btk2	0.07	15.4	8.4	2.9	0.4	---	27.1	19.4	100	100	7.7	8.3
	81-107	B't	0.04	9.1	6.3	1.0	0.3	0.2	16.9	16.3	99	100	7.2	7.9

* See footnote at end of table.

Chemical Properties of Selected Soils--Continued

Soil name and sample number*	Depth	Horizon	Organic carbon	Extractable bases (ammonium acetate) Ca	Mg	Na	K	Extractable acidity	Cation-exchange capacity Sum of cations	Ammonium acetate	Base saturation Sum of cations	Ammonium acetate	pH $CaCl_2$ 1:2	H_2O 1:1
	In		*Pct*	*-------Milliequivalents per 100 grams of soil-------*							*Pct*	*Pct*		
Kirkland	0-7	A	1.58	7.7	2.8	0.3	0.4	3.4	14.6	13.4	77	84	5.5	6.1
S93OK-109-	7-14	Bt1	0.96	17.4	13.2	3.6	0.6	4.0	38.8	35.9	90	97	6.3	7.3
004	14-24	Bt2	0.57	---	14.5	5.8	0.4	1.3	---	34.2	---	100	7.6	8.2
	24-36	Btn1	0.34	---	14.3	7.3	0.3	---	---	29.1	100	100	7.8	8.1
	36-46	Btn2	0.14	---	13.0	8.3	0.5	---	---	27.1	100	100	7.6	7.8
	46-63	Btn3	0.12	---	11.4	7.8	0.5	0.1	---	27.3	---	100	7.6	7.8
	63-80	Btn4	0.07	12.8	9.0	5.9	0.5	0.8	29.0	26.1	97	100	7.7	8.1
	80-111	Btn5	0.06	11.1	7.0	3.9	0.5	0.1	22.6	21.1	100	100	7.4	8.3
Piedmont	0-4	Ap	1.66	7.2	4.5	0.2	0.3	5.5	17.7	14.6	69	84	5.1	5.9
S91OK-109-	4-8	BA	1.06	8.8	7.3	0.7	0.3	4.9	22.0	18.9	78	90	5.5	6.5
004	8-16	Btss	0.86	13.2	15.1	2.4	0.5	4.1	35.3	32.6	88	96	6.2	7.2
	16-21	Btssk1	0.65	12.2	16.0	3.7	0.5	3.1	35.5	31.8	91	100	7.0	8.0
	21-29	Btssk2	0.31	---	14.0	4.7	0.4	---	---	23.2	100	100	7.6	8.0
	29-35	BCk	0.12	---	13.3	6.2	0.3	---	---	19.9	100	100	7.5	7.9
	35-51	Cr1	0.04	---	10.2	5.0	0.2	---	---	16.3	100	100	7.5	7.9
	51-59	Cr2	0.01	---	7.7	3.2	0.2	---	---	15.3	100	100	7.6	8.2
Renthin	0-4	Ap	2.60	12.2	3.9	0.2	0.5	5.7	22.5	17.6	75	95	5.8	6.6
S91OK-109-	4-10	BA	1.59	12.5	6.3	0.2	0.5	6.4	25.9	20.9	75	93	5.7	6.3
001	10-15	Bt1	1.23	14.1	8.8	0.2	0.5	7.0	30.6	26.0	77	91	5.6	6.4
	15-22	Bt2	0.82	16.0	10.4	0.3	0.5	6.6	33.8	29.5	80	92	5.7	6.5
	22-29	Btss	0.61	14.8	10.0	0.4	0.6	5.0	30.8	27.2	84	95	5.9	6.8
	29-42	Btssk	0.27	---	9.0	0.5	0.4	---	---	21.7	100	100	7.1	7.7
	42-55	Btk	0.10	14.6	9.1	0.9	0.3	---	24.9	18.1	100	100	7.3	8.1
	55-66	Cr1	0.05	---	15.3	2.1	0.3	---	---	22.6	100	100	7.8	8.7
	66-77	Cr2	0.03	---	10.4	1.0	0.3	---	---	8.0	100	100	7.9	8.9
Stephen-	0-5	A	0.72	2.2	0.5	0.1	0.2	2.6	5.6	3.5	54	86	4.9	5.8
ville	5-15	E	0.17	0.9	0.4	0.1	0.1	1.0	2.5	1.8	60	83	4.7	5.3
S91OK-109-	15-25	Bt1	0.36	4.5	3.8	0.1	0.4	5.6	14.4	11.2	61	79	4.4	5.2
002	25-33	Bt2	0.24	3.9	3.4	0.1	0.3	4.3	12.0	9.2	64	84	4.5	5.2
	33-40	Cr1	0.10	2.0	1.6	0.1	0.2	1.8	5.7	4.2	68	93	4.7	5.5
	40-51	Cr2	0.06	1.4	1.3	0.1	0.1	1.3	4.2	3.3	69	88	4.7	5.5
Teval	0-6	A	2.01	9.7	2.3	---	0.6	3.8	16.4	13.8	77	91	5.6	6.0
S92OK-109-	6-10	BA	1.31	10.9	2.8	---	0.4	4.4	18.5	16.3	76	87	5.5	6.2
002	10-14	Bt1	0.95	13.8	3.4	TR	0.3	4.4	21.9	19.9	80	88	5.6	6.4
	14-25	Bt2	0.55	15.6	3.0	TR	0.2	2.6	21.4	16.6	88	100	6.2	6.8
	25-34	Btk	0.45	---	3.0	TR	0.3	---	---	12.9	100	100	7.6	8.1
	34-55	2C1	0.30	---	3.2	---	0.2	---	---	13.1	100	100	7.6	8.1
	55-83	2C2	0.46	1.6	0.3	---	0.2	2.4	4.5	2.9	47	72	4.2	4.5
Waurika	0-8	Ap	0.81	8.8	2.1	0.3	0.1	3.8	15.1	12.4	75	91	5.5	6.2
S92OK-109-	10-13	E	0.31	5.6	1.5	0.1	0.1	2.1	9.4	8.4	78	87	5.6	6.4
003	13-24	Bt1	0.30	11.5	4.3	0.3	0.5	8.8	25.4	17.5	65	95	6.0	6.8
	24-38	Bt2	0.18	11.6	4.5	0.2	0.6	2.9	19.8	17.3	85	98	6.2	7.0
Zaneis	0-6	A1	2.46	7.5	1.6	0.1	0.6	5.4	15.2	11.2	64	87	5.3	5.9
S91OK-109-	6-12	A2	1.26	6.1	1.8	0.1	0.2	4.8	13.0	10.0	63	82	5.1	5.8
003	12-19	BA	1.09	6.9	2.6	0.1	0.3	5.2	15.1	11.9	66	83	5.1	5.8
	19-31	Bt1	0.71	9.6	5.1	0.2	0.4	5.7	21.0	16.7	73	92	5.2	6.1
	31-39	Bt2	0.36	8.4	5.0	0.1	0.3	3.8	17.6	14.9	78	93	5.3	6.0
	39-47	Bt3	0.20	6.3	4.0	0.1	0.2	3.4	14.0	11.6	76	91	5.4	6.5
	47-55	Bt4	0.14	6.0	4.0	0.3	0.2	2.5	13.0	11.0	81	95	5.6	6.5
	55-59	BC	0.09	5.4	3.7	0.1	0.2	2.4	11.8	9.9	80	95	5.7	6.4
	59-65	Cr	0.04	2.8	2.1	0.1	0.1	3.0	8.1	5.3	63	96	5.8	6.5

*The location of sampled pedons is described on the following page.

Bethany (S91OK-109-006), about 800 feet south and 140 feet west of the northeast corner of sec. 16, T. 14 N., R. 4 W. This is the typical pedon for the BetB map unit in the survey area.

Canadian (S93OK-109-002), about 1,300 feet north and 100 feet west of the southeast corner of sec. 21, T. 13 N., R. 1 W. This is the typical pedon for the Official Series Description and for the taxonomic unit and the CaaA map unit in the survey area.

Doolin (S92OK-109-004), about 1,700 feet south and 550 feet west of the northeast corner of sec. 9, T. 13 N., R. 4 W. Reaction in the surface layer is slightly less than the series allows. This pedon is similar to that of the KrdA map unit in the survey area.

Hibsaw (S93OK-109-001), about 600 feet south and 150 feet west of the northeast corner of sec. 14, T. 14 N., R. 1 E. This is the typical pedon for the Official Series Description and for the taxonomic unit and the HiLA map unit in the survey area.

Huska (S92OK-109-001), about 2,080 feet south and 1,780 feet east of the northwest corner of sec. 11, T. 14 N., R. 3 W. Reaction in the surface layer is slightly less than the series allows, but this difference is insignificant. This is the typical pedon for the Huska part of the PdHC map unit in the survey area.

Kirkland (S88OK-109-003), about 1,750 feet north and 360 feet east of the southwest corner of sec. 15, T. 14 N., R. 4 W. This is the typical pedon for the KrdA map unit in the survey area.

Kirkland (S93OK-109-003), about 480 feet north and 1,250 feet west of the southeast corner of sec. 15, T. 11 N., R. 4 W. Data from this pedon support the series and the KrdA map unit in the survey area.

Kirkland (S93OK-109-004), about 2,250 feet north and 120 feet east of the southeast corner of sec. 25, T. 11 N., R. 4 W. This pedon was sampled as a project to determine the exchangeable sodium percentage and as support data for the KrdA map unit in the survey area.

Piedmont (S91OK-109-004), about 1,300 feet south and 2,000 feet west of the northeast corner of sec. 9, T. 14 N., R. 4 W. This is the typical pedon for the Official Series Description and for the taxonomic unit and the PimB map unit in the survey area.

Renfrow (S91OK-109-005), about 600 feet south and 500 feet east of the northwest corner of sec. 14, T. 14 N., R. 4 W. This is the typical pedon for the RenB map unit in the survey area.

Renthin (S91OK-109-001), about 2,500 feet north and 1,500 feet east of the southwest corner of sec. 26, T. 13 N., R. 3 W. This is the typical pedon for the Official Series Description and for the taxonomic unit and the RinB map unit in the survey area.

Stephenville (S91OK-109-002), about 750 feet south and 450 feet east of the northwest corner of sec. 8, T. 12 N., R. 1 W. This is the typical pedon for the Official Series Description and the taxonomic unit and provides support data for the Stephenville part of the SDND map unit in the survey area.

Teval (S92OK-109-002), about 2,500 feet south and 1,550 feet west of the northeast corner of sec. 2, T. 14 N., R. 4 W. Reaction in the 2C2 horizon is less than the series allows, but this difference is considered a laboratory error or the result of a contaminated sample. This pedon was sampled as support data for the series and the TevD map unit in the survey area.

Waurika (S92OK-109-003), about 2,230 feet north and 2,540 feet west of the southeast corner of sec. 6, T. 12 N., R. 4 W. This is the typical pedon for the WauA map unit in the survey area.

Zaneis (S91OK-109-003), about 100 feet south and 1,000 feet east of the northwest corner of sec. 6, T. 14 N., R. 2 W. This is the typical pedon for the Official Series Description and for the taxonomic unit and the ZanC map unit in the survey area.

Water Features

The table “Water Features” gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. The table “Water Features” indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and frequency are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Water Features

(See text for definitions of terms used in this table. Estimates of the frequency of flooding apply to the whole year rather than to parts of the year. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydrologic group	Month	Water table: Upper limit depth	Water table: Lower limit depth	Ponding: Surface water depth	Ponding: Duration	Flooding: Duration	Flooding: Frequency
			Ft	*Ft*	*Ft*			
AhpA:								
Ashport	B	Mar-Oct	---	---	---	---	Brief	Occasional
AmbE:								
Amber	B	All months	---	---	---	---	Extremely brief	Rare
AshA:								
Asher	C	All months	---	---	---	---	Extremely brief	Rare
AspA:								
Ashport	B	Mar-Oct	---	---	---	---	Brief	Occasional
AstA:								
Ashport	B	Mar-Oct	---	---	---	---	Brief	Frequent
BetA:								
Bethany	C	All months	---	---	---	---	---	---
BetB:								
Bethany	C	All months	---	---	---	---	---	---
BeUB:								
Bethany	C	All months	---	---	---	---	---	---
Urban land	D	All months	---	---	---	---	---	---
CaaA:								
Canadian	B	Apr-Nov	---	---	---	---	Very brief	Rare
CaUB:								
Canadian	B	Apr-Nov	---	---	---	---	Extremely brief	Rare
Urban land	D	Apr-Nov	---	---	---	---	Very brief	Rare
CoIC2:								
Coyle	B	All months	---	---	---	---	---	---
Ironmound	C	All months	---	---	---	---	---	---
CoUB:								
Coyle	B	All months	---	---	---	---	---	---
Urban land	D	All months	---	---	---	---	---	---
CoyB:								
Coyle	B	All months	---	---	---	---	---	---
DalA:								
Dale	B	Apr-Nov	---	---	---	---	Extremely brief	Rare
DAM:								
Dams	D	All months	---	---	---	---	---	---

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit depth	Water table: Lower limit depth	Ponding: Surface water depth	Ponding: Duration	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft			
DaUA:								
Dale	B	Apr-Nov	---	---	---	---	Extremely brief	Rare
Urban land	D	Apr-Nov	---	---	---	---	Very brief	Rare
DeDE:								
Derby	A	All months	---	---	---	---	---	---
Dougherty	A	All months	---	---	---	---	---	---
DerB:								
Derby	A	All months	---	---	---	---	---	---
DerE:								
Derby	A	All months	---	---	---	---	---	---
DleA:								
Dale	B	Apr-Nov	---	---	---	---	Extremely brief	Rare
DSRG:								
Darsil	C	All months	---	---	---	---	---	---
Stephenville	B	All months	---	---	---	---	---	---
Rock outcrop	D	All months	---	---	---	---	---	---
DUDE:								
Derby	A	All months	---	---	---	---	---	---
Urban land	D	All months	---	---	---	---	---	---
Dougherty	A	All months	---	---	---	---	---	---
EasA:								
Easpur	B	Mar-Nov	---	---	---	---	Brief	Occasional
GaGA:								
Gaddy	A	Mar-Oct	---	---	---	---	Very brief	Frequent
Gracemore	C	Nov-Feb	0.5-1.5	>6.0	---	---	---	---
		Mar-May	0.5-1.5	>6.0	---	---	Very brief	Frequent
		Jun-Oct	1.5-3.5	>6.0	---	---	Very brief	Frequent
GcmA:								
Gracemont	C	Nov-Feb	0.5-1.5	>6.0	---	---	---	---
		Mar-May	0.5-1.5	>6.0	---	---	Brief	Frequent
		Jun-Oct	1.5-3.5	>6.0	---	---	Brief	Frequent
GmtA:								
Gracemont	C	Nov-Feb	0.5-1.5	>6.0	---	---	---	---
		Mar-May	0.5-1.5	>6.0	---	---	Brief	Occasional
		Jun-Sept	1.5-3.5	>6.0	---	---	Brief	Occasional
GraC:								
Grainola	D	All months	---	---	---	---	---	---
GrAD:								
Grainola	D	All months	---	---	---	---	---	---

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit depth	Water table: Lower limit depth	Ponding: Surface water depth	Ponding: Duration	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft			
GrAD:								
Ashport	B	Mar-Oct	---	---	---	---	Brief	Frequent
GrHC:								
Grant	B	All months	---	---	---	---	---	---
Huska	D	All months	---	---	---	---	---	---
GrIE:								
Grainola	D	All months	---	---	---	---	---	---
Ironmound	C	All months	---	---	---	---	---	---
GrPB2:								
Grainola	D	All months	---	---	---	---	---	---
Piedmont	D	All months	---	---	---	---	---	---
GrPC2:								
Grainola	D	All months	---	---	---	---	---	---
Piedmont	D	All months	---	---	---	---	---	---
GUIE:								
Grainola	D	All months	---	---	---	---	---	---
Urban land	D	All months	---	---	---	---	---	---
Ironmound	C	All months	---	---	---	---	---	---
HarC:								
Harrah	B	All months	---	---	---	---	---	---
HarC2:								
Harrah	B	All months	---	---	---	---	---	---
HarC4:								
Harrah	B	All months	---	---	---	---	---	---
HarG:								
Harrah	B	All months	---	---	---	---	---	---
HaUC:								
Harrah	B	All months	---	---	---	---	---	---
Urban land	D	All months	---	---	---	---	---	---
HiLA:								
Hibsaw	D	Nov-Feb	0.0	>6.0	0.0-1.0	Long	---	---
		Mar-Oct	0.0	>6.0	0.0-1.0	Long	Brief	Occasional
Lomill	D	Nov-Feb	2.5-6.0	>6.0	---	---	---	---
		Mar Oct	2.5-6.0	>6.0	---	---	Brief	Occasional
IrCE:								
Ironmound	C	All months	---	---	---	---	---	---
Coyle	B	All months	---	---	---	---	---	---
IrKD:								
Ironmound	C	All months	---	---	---	---	---	---

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit depth	Water table: Lower limit depth	Ponding: Surface water depth	Ponding: Duration	Flooding: Duration	Flooding: Frequency
			Ft	*Ft*	*Ft*			
IrKD:								
Kingfisher----------------	B	All months	---	---	---	---	---	---
KekA:								
Keokuk--------------------	B	Apr-Nov	---	---	---	---	Extremely brief	Rare
KeoA:								
Keokuk--------------------	B	Mar-Oct	---	---	---	---	Very brief	Occasional
KeUA:								
Keokuk--------------------	B	Apr-Nov	---	---	---	---	Extremely brief	Rare
Urban land----------------	D	Apr-Nov	---	---	---	---	Very brief	Rare
KgIC:								
Kingfisher----------------	B	All months	---	---	---	---	---	---
Ironmound-----------------	C	All months	---	---	---	---	---	---
KowB:								
Konawa--------------------	B	All months	---	---	---	---	---	---
KowD:								
Konawa--------------------	B	All months	---	---	---	---	---	---
KowD2:								
Konawa--------------------	B	All months	---	---	---	---	---	---
KowD4:								
Konawa--------------------	B	All months	---	---	---	---	---	---
KrdA:								
Kirkland------------------	D	All months	---	---	---	---	---	---
KrUA:								
Kirkland------------------	D	All months	---	---	---	---	---	---
Urban land----------------	D	All months	---	---	---	---	---	---
KUIC:								
Kingfisher----------------	B	All months	---	---	---	---	---	---
Urban land----------------	D	All months	---	---	---	---	---	---
Ironmound-----------------	C	All months	---	---	---	---	---	---
KwUD:								
Konawa--------------------	B	All months	---	---	---	---	---	---
Urban land----------------	D	All months	---	---	---	---	---	---
LarA:								
Lawrie--------------------	B	Mar-Oct	---	---	---	---	Very brief	Occasional
LatG:								
Latrass-------------------	D	All months	---	---	---	---	---	---

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit depth	Water table: Lower limit depth	Ponding: Surface water depth	Ponding: Duration	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft			
LawA:								
Lawrie	B	Apr-Nov	---	---	---	---	Extremely brief	Rare
LitB:								
Littleaxe	B	All months	---	---	---	---	---	---
LitC:								
Littleaxe	B	All months	---	---	---	---	---	---
LitC2:								
Littleaxe	B	All months	---	---	---	---	---	---
LomA:								
Lomill	D	Nov-Feb	2.5-6.0	>6.0	---	---	---	---
		Mar-Oct	2.5-6.0	>6.0	---	---	Brief	Occasional
LtUC:								
Littleaxe	B	All months	---	---	---	---	---	---
Urban land	D	All months	---	---	---	---	---	---
LweA:								
Lawrie	B	Mar-Oct	---	---	---	---	Very brief	Occasional
LwfA:								
Lawrie	B	Mar-Oct	---	---	---	---	Very brief	Occasional
LwUA:								
Lawrie	B	Apr-Nov	---	---	---	---	Extremely brief	Rare
Urban land	D	Apr-Nov	---	---	---	---	Very brief	Rare
MlfA:								
Miller	D	Mar-Oct	---	---	---	---	Brief	Occasional
MllA:								
Miller	D	Mar-Oct	---	---	---	---	Brief	Occasional
M-W:								
Miscellaneous water.								
NewB:								
Newalla	D	All months	---	---	---	---	---	---
NewC2:								
Newalla	D	All months	---	---	---	---	---	---
NorB:								
Norge	B	All months	---	---	---	---	---	---
NorC:								
Norge	B	All months	---	---	---	---	---	---
NorC2:								
Norge	B	All months	---	---	---	---	---	---
NoUC:								
Norge	B	All months	---	---	---	---	---	---

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit depth	Water table: Lower limit depth	Ponding: Surface water depth	Ponding: Duration	Flooding: Duration	Flooding: Frequency
			Ft	*Ft*	*Ft*			
NoUC:								
Urban land	D	All months	---	---	---	---	---	---
PdHC:								
Piedmont	D	All months	---	---	---	---	---	---
Huska	D	All months	---	---	---	---	---	---
PieC2:								
Piedmont	D	All months	---	---	---	---	---	---
PimB:								
Piedmont	D	All months	---	---	---	---	---	---
PimC:								
Piedmont	D	All months	---	---	---	---	---	---
PIT:								
Pits.								
PukA:								
Pulaski	B	Mar-Oct	---	---	---	---	Very brief	Frequent
PulA:								
Pulaski	B	Mar-Oct	---	---	---	---	Very brief	Occasional
RenB:								
Renfrow	D	All months	---	---	---	---	---	---
RinB:								
Renthin	D	All months	---	---	---	---	---	---
RnnB:								
Renthin	D	All months	---	---	---	---	---	---
RnnC2:								
Renthin	D	All months	---	---	---	---	---	---
RnUC:								
Renthin	D	All months	---	---	---	---	---	---
Urban land	D	All months	---	---	---	---	---	---
SDGD4:								
Stephenville	B	All months	---	---	---	---	---	---
Darsil	C	All months	---	---	---	---	---	---
Gullied land.								
SDND:								
Stephenville	B	All months	---	---	---	---	---	---
Darsil	C	All months	---	---	---	---	---	---
Newalla	D	All months	---	---	---	---	---	---
SDND2:								
Stephenville	B	All months	---	---	---	---	---	---
Darsil	C	All months	---	---	---	---	---	---

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit depth	Water table: Lower limit depth	Ponding: Surface water depth	Ponding: Duration	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft			
SDND2:								
Newalla	D	All months	---	---	---	---	---	---
StDC:								
Stephenville	B	All months	---	---	---	---	---	---
Darsil	C	All months	---	---	---	---	---	---
StDC2:								
Stephenville	B	All months	---	---	---	---	---	---
Darsil	C	All months	---	---	---	---	---	---
StLC4:								
Stephenville	B	All months	---	---	---	---	---	---
Littleaxe	B	All months	---	---	---	---	---	---
SUND:								
Stephenville	B	All months	---	---	---	---	---	---
Urban land	D	All months	---	---	---	---	---	---
Newalla	D	All months	---	---	---	---	---	---
TevD:								
Teval	B	All months	---	---	---	---	---	---
TevD2:								
Teval	B	All months	---	---	---	---	---	---
TlrB:								
Teller	B	All months	---	---	---	---	---	---
TlrC:								
Teller	B	All months	---	---	---	---	---	---
TlrC2:								
Teller	B	All months	---	---	---	---	---	---
TlrD:								
Teller	B	All months	---	---	---	---	---	---
TlUD:								
Teller	B	All months	---	---	---	---	---	---
Urban land	D	All months	---	---	---	---	---	---
TriA:								
Tribbey	C	Oct-May	0.5-3.5	>6.0	---	---	Brief	Frequent
		Jun-Sept	2.5-5.0	>6.0	---	---	Brief	Frequent
URB:								
Urban land	D	All months	---	---	---	---	---	---
VanA:								
Vanoss	B	All months	---	---	---	---	---	---
VanB:								
Vanoss	B	All months	---	---	---	---	---	---

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit depth	Water table: Lower limit depth	Ponding: Surface water depth	Ponding: Duration	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft			
W:								
Water.								
WauA:								
Waurika	D	Nov-May	0.7-1.5	0.7-1.5	---	---	---	---
WtgA:								
Watonga	D	Apr-Nov	---	---	---	---	Extremely brief	Rare
WuUA:								
Watonga	D	Apr-Nov	---	---	---	---	Extremely brief	Rare
Urban land	D	Apr-Nov	---	---	---	---	Very brief	Rare
YaGA:								
Yahola	B	Apr-Oct	---	---	---	---	Brief	Occasional
Gaddy	A	Mar-Oct	---	---	---	---	Very brief	Occasional
YahA:								
Yahola	B	Apr-Oct	---	---	---	---	Brief	Occasional
YaUA:								
Yahola	B	Apr-Nov	---	---	---	---	Extremely brief	Rare
Urban land	D	All months	---	---	---	---	---	---
ZanB:								
Zaneis	B	All months	---	---	---	---	---	---
ZanC:								
Zaneis	B	All months	---	---	---	---	---	---
ZanC2:								
Zaneis	B	All months	---	---	---	---	---	---
ZaUC:								
Zaneis	B	All months	---	---	---	---	---	---
Urban land	D	All months	---	---	---	---	---	---

Soil Features

The table "Soil Features" gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	*In*				
AhpA:							
Ashport----------------	---	---	---	---	None	Moderate	Low
AmbE:							
Amber------------------	---	---	---	---	None	Low	Low
AshA:							
Asher------------------	---	---	---	---	None	High	Low
AspA:							
Ashport----------------	---	---	---	---	None	Moderate	Low
AstA:							
Ashport----------------	---	---	---	---	None	Moderate	Low
BetA:							
Bethany----------------	---	---	---	---	None	High	Low
BetB:							
Bethany----------------	---	---	---	---	None	High	Low
BeUB:							
Bethany----------------	---	---	---	---	None	High	Low
Urban land-------------	---	4-60	---	---	None	---	---
CaaA:							
Canadian---------------	---	---	---	---	None	Low	Low
CaUB:							
Canadian---------------	---	---	---	---	None	Low	Low
Urban land-------------	---	4-60	---	---	None	---	---
CoIC2:							
Coyle------------------	Bedrock (paralithic)	20-40	---	Soft	None	Moderate	Low
Ironmound--------------	Bedrock (paralithic)	10-20	---	Soft	None	Low	Low
CoUB:							
Coyle------------------	Bedrock (paralithic)	20-40	---	Soft	None	Moderate	Low
Urban land-------------	---	4-60	---	---	None	---	---
CoyB:							
Coyle------------------	Bedrock (paralithic)	20-40	---	Soft	None	Moderate	Low
DalA:							
Dale-------------------	---	---	---	---	None	Moderate	Low
DAM:							
Dams-------------------	---	4-60	---	---	None	---	---

Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	*In*				
DaUA:							
Dale	---	---	---	---	None	Moderate	Low
Urban land	---	4-60	---	---	None	---	---
DeDE:							
Derby	---	---	---	---	None	Low	Moderate
Dougherty	---	---	---	---	None	Moderate	Moderate
DerB:							
Derby	---	---	---	---	None	Low	Moderate
DerE:							
Derby	---	---	---	---	None	Low	Moderate
DleA:							
Dale	---	---	---	---	None	Moderate	Low
DSRG:							
Darsil	Bedrock (paralithic)	10-20	---	Soft	None	Low	Moderate
Stephenville	Bedrock (paralithic)	20-40	---	Soft	None	Moderate	Moderate
Rock outcrop	Bedrock (paralithic)	0-3	---	Soft	None	---	---
DUDE:							
Derby	---	---	---	---	None	Low	Moderate
Urban land	---	4-60	---	---	None	---	---
Dougherty	---	---	---	---	None	Moderate	Moderate
EasA:							
Easpur	---	---	---	---	None	Moderate	Low
GaGA:							
Gaddy	---	---	---	---	None	Low	Low
Gracemore	---	---	---	---	None	Moderate	Low
GcmA:							
Gracemont	---	---	---	---	None	High	High
GmtA:							
Gracemont	---	---	---	---	None	Moderate	Low
GraC:							
Grainola	Bedrock (paralithic)	20-40	---	Soft	None	High	Low
GrAD:							
Grainola	Bedrock (paralithic)	20-40	---	Soft	None	High	Low
Ashport	---	---	---	---	None	Moderate	Low

Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
GrHC:							
Grant	Bedrock (paralithic)	40-60	---	Soft	None	Moderate	Low
Huska	Bedrock (paralithic)	40-60	---	Soft	None	High	Moderate
GrIE:							
Grainola	Bedrock (paralithic)	20-40	---	Soft	None	High	Low
Ironmound	Bedrock (paralithic)	10-20	---	Soft	None	Low	Low
GrPB2:							
Grainola	Bedrock (paralithic)	20-40	---	Soft	None	High	Low
Piedmont	Bedrock (paralithic)	20-40	---	Soft	None	High	Low
GrPC2:							
Grainola	Bedrock (paralithic)	20-40	---	Soft	None	High	Low
Piedmont	Bedrock (paralithic)	20-40	---	Soft	None	High	Low
GUIE:							
Grainola	Bedrock (paralithic)	20-40	---	Soft	None	High	Low
Urban land	---	4-60	---	---	None	---	---
Ironmound	Bedrock (paralithic)	10-20	---	Soft	None	Low	Low
HarC:							
Harrah	---	---	---	---	None	Moderate	Moderate
HarC2:							
Harrah	---	---	---	---	None	Moderate	Moderate
HarC4:							
Harrah	---	---	---	---	None	Moderate	Moderate
HarG:							
Harrah	---	---	---	---	None	Moderate	Moderate
HaUC:							
Harrah	---	---	---	---	None	Moderate	Moderate
Urban land	---	4-60	---	---	None	---	---
HiLA:							
Hibsaw	---	---	---	---	None	High	High
Lomill	---	---	---	---	None	High	Low

Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
IrCE:							
Ironmound	Bedrock (paralithic)	10-20	---	Soft	None	Low	Low
Coyle	Bedrock (paralithic)	20-40	---	Soft	None	Moderate	Low
IrKD:							
Ironmound	Bedrock (paralithic)	10-20	---	Soft	None	Low	Low
Kingfisher	Bedrock (paralithic)	20-40	---	Soft	None	Moderate	Low
KekA:							
Keokuk	---	---	---	---	None	Low	Low
KeoA:							
Keokuk	---	---	---	---	None	Low	Low
KeUA:							
Keokuk	---	---	---	---	None	Low	Low
Urban land	---	4-60	---	---	None	---	---
KgIC:							
Kingfisher	Bedrock (paralithic)	20-40	---	Soft	None	Moderate	Low
Ironmound	Bedrock (paralithic)	10-20	---	Soft	None	Low	Low
KowB:							
Konawa	---	---	---	---	None	Moderate	Moderate
KowD:							
Konawa	---	---	---	---	None	Moderate	Moderate
KowD2:							
Konawa	---	---	---	---	None	Moderate	Moderate
KowD4:							
Konawa	---	---	---	---	None	Moderate	Moderate
KrdA:							
Kirkland	Bedrock (paralithic)	60-99	---	Soft	None	High	Low
KrUA:							
Kirkland	Bedrock (paralithic)	60-99	---	Soft	None	High	Low
Urban land	---	4-60	---	---	None	---	---
KUIC:							
Kingfisher	Bedrock (paralithic)	20-40	---	Soft	None	Moderate	Low
Urban land	---	4-60	---	---	None	---	---

Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	*In*				
KUIC:							
Ironmound----------------	Bedrock (paralithic)	10-20	---	Soft	None	Low	Low
KwUD:							
Konawa-----------------	---	---	---	---	None	Moderate	Moderate
Urban land-------------	---	4-60	---	---	None	---	---
LarA:							
Lawrie-----------------	---	---	---	---	None	Moderate	Low
LatG:							
Latrass----------------	---	---	---	---	None	High	High
LawA:							
Lawrie-----------------	---	---	---	---	None	Moderate	Low
LitB:							
Littleaxe--------------	Bedrock (paralithic)	40-60	---	Soft	None	Moderate	Moderate
LitC:							
Littleaxe--------------	Bedrock (paralithic)	40-60	---	Soft	None	Moderate	Moderate
LitC2:							
Littleaxe--------------	Bedrock (paralithic)	40-60	---	Soft	None	Moderate	Moderate
LomA:							
Lomill-----------------	---	---	---	---	None	High	Low
LtUC:							
Littleaxe--------------	Bedrock (paralithic)	40-60	---	Soft	None	Moderate	Moderate
Urban land-------------	---	4-60	---	---	None	---	---
LweA:							
Lawrie-----------------	---	---	---	---	None	Moderate	Low
LwfA:							
Lawrie-----------------	---	---	---	---	None	Moderate	Low
LwUA:							
Lawrie-----------------	---	---	---	---	None	Moderate	Low
Urban land-------------	---	4-60	---	---	None	---	---
MlfA:							
Miller-----------------	---	---	---	---	None	High	Low
MllA:							
Miller-----------------	---	---	---	---	None	High	Low
M-W:							
Miscellaneous water.							

Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	*In*				
NewB:							
Newalla----------------	Bedrock (paralithic)	40-60	---	Soft	None	High	Moderate
NewC2:							
Newalla----------------	Bedrock (paralithic)	40-60	---	Soft	None	High	Moderate
NorB:							
Norge------------------	---	---	---	---	None	Moderate	Low
NorC:							
Norge------------------	---	---	---	---	None	Moderate	Low
NorC2:							
Norge------------------	---	---	---	---	None	Moderate	Low
NoUC:							
Norge------------------	---	---	---	---	None	Moderate	Low
Urban land-------------	---	4-60	---	---	None	---	---
PdHC:							
Piedmont---------------	Bedrock (paralithic)	20-40	---	Soft	None	High	Low
Huska------------------	Bedrock (paralithic)	40-60	---	Soft	None	High	Moderate
PieC2:							
Piedmont---------------	Bedrock (paralithic)	20-40	---	Soft	None	High	Low
PimB:							
Piedmont---------------	Bedrock (paralithic)	20-40	---	Soft	None	High	Low
PimC:							
Piedmont---------------	Bedrock (paralithic)	20-40	---	Soft	None	High	Low
PIT:							
Pits-------------------	---	---	---	---	None	---	---
PukA:							
Pulaski----------------	---	---	---	---	None	Low	Moderate
PulA:							
Pulaski----------------	---	---	---	---	None	Low	Moderate
RenB:							
Renfrow----------------	---	---	---	---	None	High	Low
RinB:							
Renthin----------------	Bedrock (paralithic)	40-60	---	Soft	None	High	Low
RnnB:							
Renthin----------------	Bedrock (paralithic)	40-60	---	Soft	None	High	Low

Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
RnnC2:							
Renthin----------------	Bedrock (paralithic)	40-60	---	Soft	None	High	Low
RnUC:							
Renthin----------------	Bedrock (paralithic)	40-60	---	Soft	None	High	Low
Urban land-------------	---	4-60	---	---	None	---	---
SDGD4:							
Stephenville-----------	Bedrock (paralithic)	20-40	---	Soft	None	Moderate	Moderate
Darsil-----------------	Bedrock (paralithic)	10-20	---	Soft	None	Low	Moderate
Gullied land-----------	---	---	---	---	None	---	---
SDND:							
Stephenville-----------	Bedrock (paralithic)	20-40	---	Soft	None	Moderate	Moderate
Darsil-----------------	Bedrock (paralithic)	10-20	---	Soft	None	Low	Moderate
Newalla----------------	Bedrock (paralithic)	40-60	---	Soft	None	High	Moderate
SDND2:							
Stephenville-----------	Bedrock (paralithic)	20-40	---	Soft	None	Moderate	Moderate
Darsil-----------------	Bedrock (paralithic)	10-20	---	Soft	None	Low	Moderate
Newalla----------------	Bedrock (paralithic)	40-60	---	Soft	None	High	Moderate
StDC:							
Stephenville-----------	Bedrock (paralithic)	20-40	---	Soft	None	Moderate	Moderate
Darsil-----------------	Bedrock (paralithic)	10-20	---	Soft	None	Low	Moderate
StDC2:							
Stephenville-----------	Bedrock (paralithic)	20-40	---	Soft	None	Moderate	Moderate
Darsil-----------------	Bedrock (paralithic)	10-20	---	Soft	None	Low	Moderate
StLC4:							
Stephenville-----------	Bedrock (paralithic)	20-40	---	Soft	None	Moderate	Moderate
Littleaxe--------------	Bedrock (paralithic)	40-60	---	Soft	None	Moderate	Moderate

Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	*In*				
SUND:							
Stephenville-----------	Bedrock (paralithic)	20-40	---	Soft	None	Moderate	Moderate
Urban land-------------	---	4-60	---	---	None	---	---
Newalla----------------	Bedrock (paralithic)	40-60	---	Soft	None	High	Moderate
TevD:							
Teval------------------	---	---	---	---	None	Low	Low
TevD2:							
Teval------------------	---	---	---	---	None	Low	Low
TlrB:							
Teller-----------------	---	---	---	---	None	Low	Moderate
TlrC:							
Teller-----------------	---	---	---	---	None	Low	Moderate
TlrC2:							
Teller-----------------	---	---	---	---	None	Low	Moderate
TlrD:							
Teller-----------------	---	---	---	---	None	Low	Moderate
TlUD:							
Teller-----------------	---	---	---	---	None	Low	Moderate
Urban land-------------	---	4-60	---	---	None	---	---
TriA:							
Tribbey----------------	---	---	---	---	None	High	Low
URB:							
Urban land-------------	---	4-60	---	---	None	---	---
VanA:							
Vanoss-----------------	---	---	---	---	None	Moderate	Moderate
VanB:							
Vanoss-----------------	---	---	---	---	None	Moderate	Moderate
W:							
Water.							
WauA:							
Waurika----------------	---	---	---	---	None	High	Moderate
WtgA:							
Watonga----------------	---	---	---	---	None	High	Low
WuUA:							
Watonga----------------	---	---	---	---	None	High	Low
Urban land-------------	---	4-60	---	---	None	---	---
YaGA:							
Yahola-----------------	---	---	---	---	None	Low	Low

Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	*In*				
YaGA:							
Gaddy------------------	---	---	---	---	None	Low	Low
YahA:							
Yahola-----------------	---	---	---	---	None	Low	Low
YaUA:							
Yahola-----------------	---	---	---	---	None	Low	Low
Urban land-------------	---	4-60	---	---	None	---	---
ZanB:							
Zaneis-----------------	Bedrock (paralithic)	40-60	---	Soft	None	Moderate	Low
ZanC:							
Zaneis-----------------	Bedrock (paralithic)	40-60	---	Soft	None	Moderate	Low
ZanC2:							
Zaneis-----------------	Bedrock (paralithic)	40-60	---	Soft	None	Moderate	Low
ZaUC:							
Zaneis-----------------	Bedrock (paralithic)	40-60	---	Soft	None	Moderate	Low
Urban land-------------	---	4-60	---	---	None	---	---

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Butte. An isolated small mountain or hill with steep or precipitous sides and a top variously flat, rounded, or pointed that may be a residual mass isolated by erosion or an exposed volcanic neck.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Cemented material. Material in an air-dry test specimen that does not slake after being immersed in water for 1 hour. Cemented soil material has a brittle, hard consistence caused by some cementing agent other than clay. Calcium carbonate, silica, or oxides or salts of iron and aluminum are common cementing materials.

Channeled. Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clayey soil. Silty clay, sandy clay, or clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Closed depression. A low area completely surrounded by higher ground and having no natural outlet.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

Consolidated sandstone. Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

Consolidated shale. Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

Consolidated siltstone. Siltstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coppice dune. A small dune of fine grained soil material stabilized around shrubs or small trees.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cuesta. A hill or ridge that has a gentle slope on one side and a steep slope on the other; specifically, an asymmetric, homoclinal ridge capped by resistant rock layers of slight or moderate dip.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deep soil. A soil that is 40 to 60 inches deep to bedrock or to other material that restricts the penetration of plant roots.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Delta. A body of alluvium having a surface that is nearly flat and fan shaped; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area that is at a lower elevation than the surrounding area, that collects water, and is drained into a closed depression or lake or into a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind or proportion of species or total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess salt (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited

rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Gypsum. A mineral consisting of hydrous calcium sulfate.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Heavy metal. Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion

until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Knoll. A small, low, rounded hill rising above adjacent landforms.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesa. A broad, nearly flat topped and commonly isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Microhigh. An area that is 2 to 12 inches higher than the adjacent microlow.

Microlow. An area that is 2 to 12 inches lower than the adjacent microhigh.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately deep soil. A soil that is 20 to 40 inches deep to bedrock or to other material that restricts the penetration of plant roots.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Impermeable	less than 0.0015 inch
Very slow	0.0015 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with a relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Range condition. The present composition of the plant community on a site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination

of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relict stream terrace. One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Ridge. A long, narrow elevation of the land surface. It generally is sharp crested and forms an extended upland between valleys.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline	0 to 2
Very slightly saline	2 to 4
Slightly saline	4 to 8
Moderately saline	8 to 16
Strongly saline	more than 16

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sediment. Solid, clastic material, both mineral and organic, that is in suspension, is being transported or has been moved from its site of origin by water, wind, ice, or mass wasting, and has come to rest on the earth's surface either above or below sea level.

Sedimentary plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief

kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Sedimentary uplands. Land areas of bedrock formed from water- or wind-deposited sediments. They are higher on the landscape than the flood plains.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Semiconsolidated sedimentary beds. Soft geologic sediments that disperse when fragments are placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shallow soil. A soil that is 10 to 20 inches deep to bedrock or to other material that restricts the penetration of plant roots.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 1 percent
Very gently sloping	1 to 3 percent
Gently sloping	3 to 5 percent
Moderately sloping	5 to 8 percent
Strongly sloping	8 to 12 percent
Moderately steep	12 to 20 percent
Steep	20 to 45 percent
Very steep	45 percent and higher

Classes for complex slopes are as follows:

Nearly level	0 to 3 percent
Gently undulating	1 to 5 percent
Undulating	1 to 8 percent
Gently rolling	5 to 12 percent
Rolling	5 to 15 percent
Hilly	8 to 30 percent
Steep	20 to 45 percent
Very steep	45 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent

or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to Ca^{++} + Mg^{++}. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of rock fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Strath terrace. A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and consists of the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Tailwater. The water directly downstream of a structure.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

Tread. The relatively flat terrace surface that was cut or built by stream or wave action.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. Alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Very deep soil. A soil that is more than 60 inches deep to bedrock or to other material that restricts the penetration of plant roots.

Very shallow soil. A soil that is less than 10 inches deep to bedrock or to other material that restricts the penetration of plant roots.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

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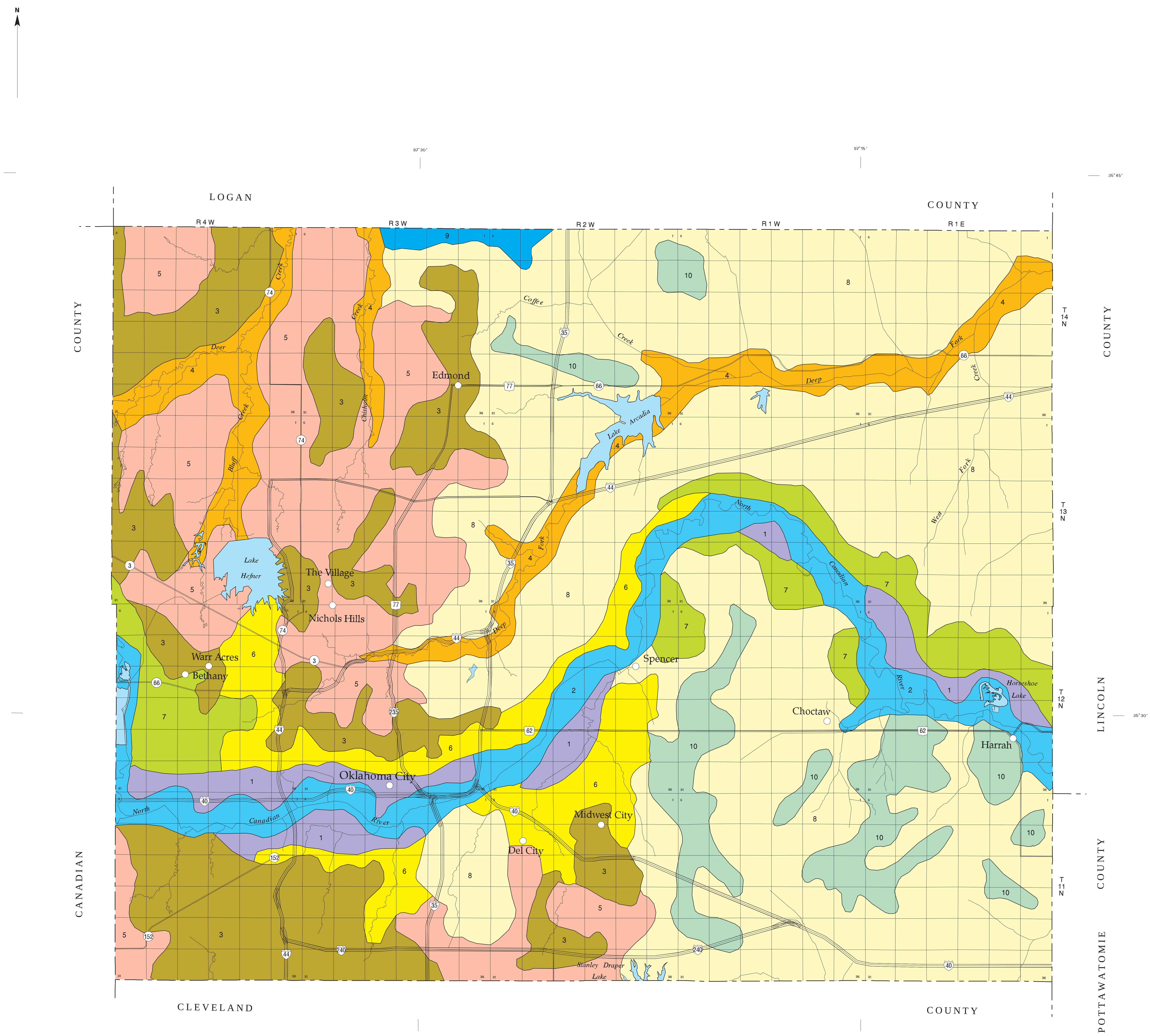


SOIL LEGEND*

STATSGO MAPUNIT NAME
General Soil Unit Name

1 OK077 DALE-BREWER-REINACH
Dale-Keokuk-Asher

2 OK078 DALE-CANADIAN-GRACEMORE
Yahola-Gracemont-Gaddy

3 OK094 KIRKLAND-RENFROW-ZANEIS
Kirkland-Urban Land-Renthin

4 OK112 PORT-PULASKI-ASHPORT
Ashport-Miller

5 OK116 RENFROW-KIRKLAND-GRAINOLA
Renthin-Grainola-Piedmont

6 OK121 TELLER-KONAWA-NORGE
Teller-Urban Land-Norge

7 OK146 KONAWA-EUFAULA-DOUGHERTY
Konawa-Derby-Urban Land

8 OK151 STEPHENVILLE-DARNELL-NEWALLA
Stephenville-Harrah-Darsil

9 OK225 COYLE-IRONMOUND-ZANEIS
Zaneis-Renthin

10 OK229 LITTLEAXE-STEPHENVILLE
Littleaxe-Stephenville

OKW WATER
Water

*The units on this legend are described in the text under the heading "General Soil Map Units." The STATSGO unit name is listed first and the County General Soil Map Unit is listed directly below, in parentheses.

Compiled 1991

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
OKLAHOMA AGRICULTURAL EXPERIMENT STATION
OKLAHOMA CONSERVATION COMMISSION

GENERAL SOIL MAP

OKLAHOMA COUNTY, OKLAHOMA

Scale 1:126000

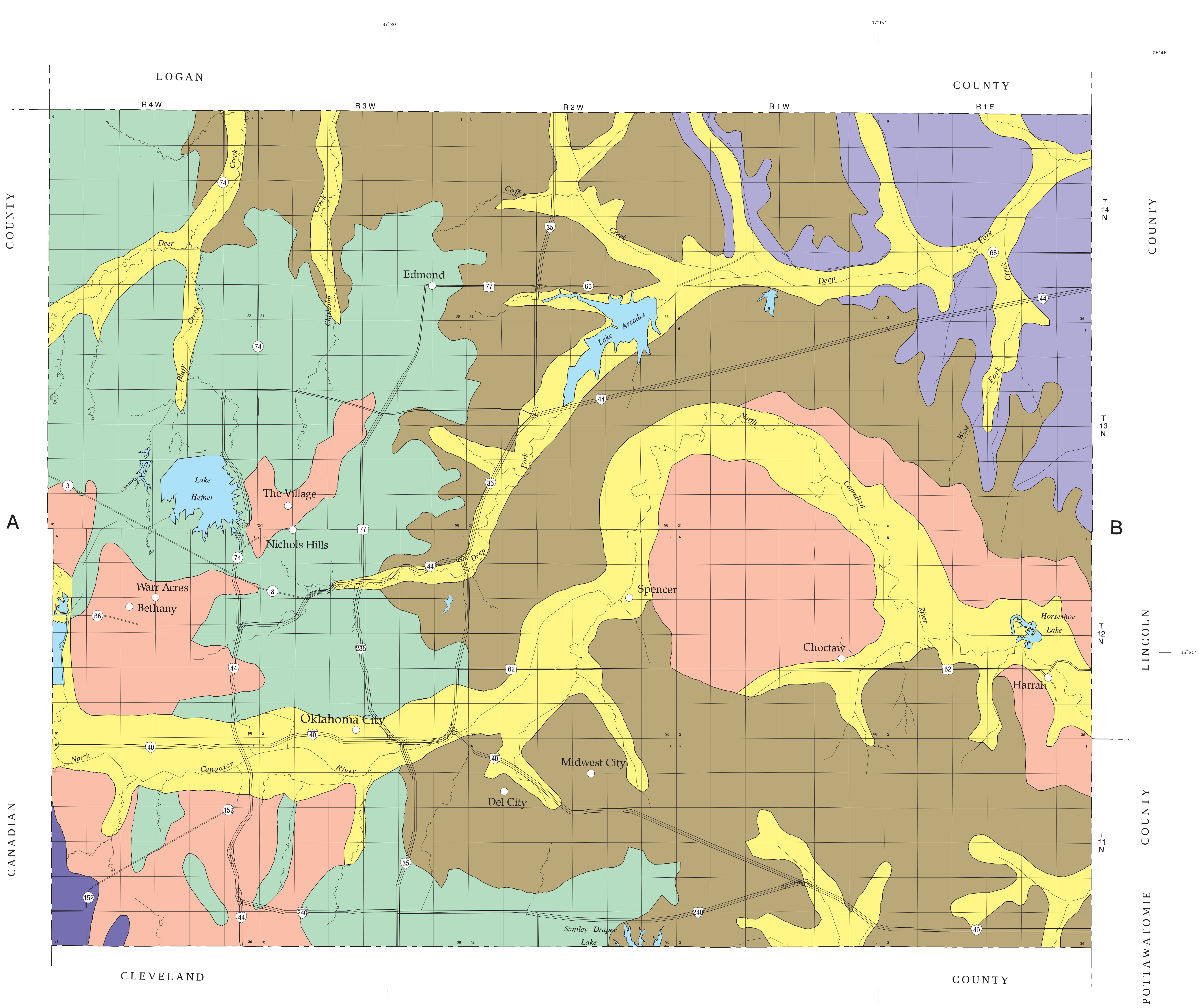
4 0 4
MILES

8 0 8
KILOMETERS

SECTIONALIZED TOWNSHIP

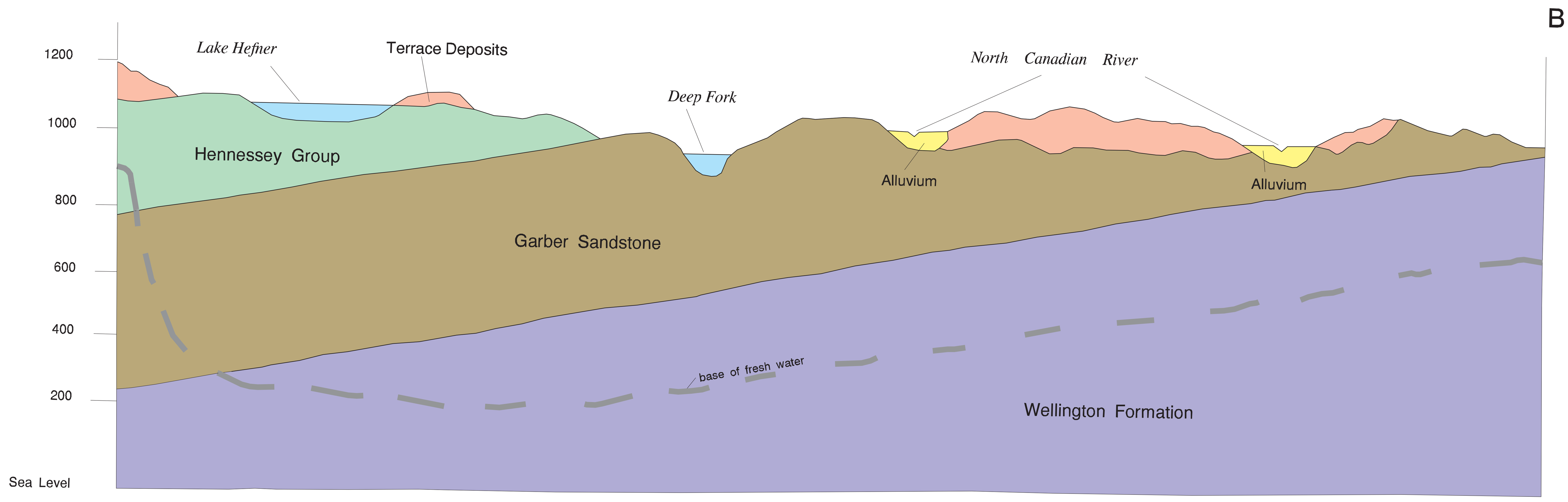
6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is meant for general planning rather than a basis for decisions on the use of specific tracts.



A

B



East - West geologic cross section between points
A and B on the Surface Geology Map of Oklahoma County

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

GEOLOGIC LEGEND

- Water
- Alluvial Deposits
- Terrace Deposits
- Duncan Sandstone
- Hennessey Group
- Garber Sandstone
- Wellington Formation

SURFACE GEOLOGY MAP
OKLAHOMA COUNTY, OKLAHOMA

Scale 1:125000

4 0 4
MILES

8 0 8
KILOMETERS

The map is meant for general planning rather than a basis for decisions on the use of specific tracts.

INDEX TO MAP SHEETS
OKLAHOMA COUNTY, OKLAHOMA

Scale 1:125000

4 0 4
MILES

8 0 8
KILOMETERS

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

SOIL LEGEND

Soil map symbols are in alphabetical order. Map symbols are alpha-numeric. The first letter, always a capital, is the initial letter of the soil series name. The second and third letters are lowercase, except in undifferentiated groups, complexes, or miscellaneous areas, and generally come from the soil name. The fourth letter is a capital and represents the slope. The fifth part of the symbol is a number and represents the erosion class.

SYMBOL	NAME
AhpA	Ashport silty clay loam, 0 to 1 percent slopes, occasionally flooded
AmbE	Amber very fine sandy loam, 5 to 15 percent slopes, rarely flooded
AshA	Asher silty clay loam, 0 to 1 percent slopes, rarely flooded
AspA	Ashport silt loam, 0 to 1 percent slopes, occasionally flooded
AstA	Ashport silt loam, 0 to 1 percent slopes, frequently flooded
BetA	Bethany silt loam, 0 to 1 percent slopes
BetB	Bethany silt loam, 1 to 3 percent slopes
BeUB	Bethany-Urban land complex, 0 to 3 percent slopes
CaaA	Canadian fine sandy loam, 0 to 1 percent slopes, rarely flooded
CaUB	Canadian-Urban land complex, 0 to 1 percent slopes, rarely flooded
CoIC2	Coyle-Ironmound complex, 3 to 5 percent slopes, eroded
CoUB	Coyle-Urban land complex, 1 to 3 percent slopes
CoyB	Coyle loam, 1 to 3 percent slopes
DalA	Dale silt loam, 0 to 1 percent slopes, rarely flooded
DAM	Dams
DaUA	Dale-Urban land complex, 0 to 1 percent slopes, rarely flooded
DeDE	Derby-Dougherty complex, 0 to 15 percent slopes
DerB	Derby loamy fine sand, 0 to 3 percent slopes
DerE	Derby loamy fine sand, 8 to 15 percent slopes
DleA	Dale silty clay loam, 0 to 1 percent slopes, rarely flooded
DSRG	Darsil-Stephenville-Rock outcrop complex, 3 to 45 percent slopes
DUDE	Derby-Urban land-Dougherty complex, 0 to 15 percent slopes
EasA	Easpur loam, 0 to 1 percent slopes, occasionally flooded
GaGA	Gaddy-Gracemore complex, 0 to 1 percent slopes, frequently flooded
GcmA	Gracemont silty clay, 0 to 1 percent slopes, frequently flooded, overwash
GmtA	Gracemont fine sandy loam, 0 to 1 percent slopes, occasionally flooded
GraC	Grainola silty clay loam, 3 to 5 percent slopes
GrAD	Grainola-Ashport complex, 0 to 8 percent slopes
GrHC	Grant-Huska complex, 1 to 5 percent slopes
GrIE	Grainola-Ironmound complex, 3 to 12 percent slopes
GrPB2	Grainola-Piedmont complex, 1 to 3 percent slopes, eroded
GrPC2	Grainola-Piedmont complex, 3 to 5 percent slopes, eroded
GUIE	Grainola-Urban land-Ironmound complex, 3 to 12 percent slopes
HarC	Harrah fine sandy loam, 3 to 5 percent slopes
HarC2	Harrah fine sandy loam, 3 to 5 percent slopes, eroded
HarC4	Harrah fine sandy loam, 3 to 5 percent slopes, gullied
HarG	Harrah fine sandy loam, 3 to 45 percent slopes
HaUC	Harrah-Urban land complex, 3 to 5 percent slopes
HiLA	Hibsaw-Lomill complex, 0 to 1 percent slopes, occasionally flooded
IrCE	Ironmound-Coyle complex, 5 to 15 percent slopes
IrKD	Ironmound-Kingfisher complex, 1 to 8 percent slopes
KekA	Keokuk very fine sandy loam, 0 to 1 percent slopes, rarely flooded
KeoA	Keokuk very fine sandy loam, 0 to 1 percent slopes, occasionally flooded
KeUA	Keokuk-Urban land complex, 0 to 1 percent slopes, rarely flooded
KgIC	Kingfisher-Ironmound complex, 1 to 5 percent slopes
KowB	Konawa fine sandy loam, 1 to 3 percent slopes
KowD	Konawa fine sandy loam, 3 to 8 percent slopes
KowD2	Konawa fine sandy loam, 3 to 8 percent slopes, eroded
KowD4	Konawa fine sandy loam, 3 to 8 percent slopes, gullied
KrdA	Kirkland silt loam, 0 to 1 percent slopes
KrUA	Kirkland-Urban land complex, 0 to 1 percent slopes
KUIC	Kingfisher-Urban land-Ironmound complex, 1 to 5 percent slopes
KwUD	Konawa-Urban land complex, 1 to 8 percent slopes
LarA	Lawrie silt loam, 0 to 1 percent slopes, occasionally flooded
LatG	Latrass loam, 1 to 45 percent slopes
LawA	Lawrie loam, 0 to 1 percent slopes, rarely flooded
LitB	Littleaxe fine sandy loam, 1 to 3 percent slopes
LitC	Littleaxe fine sandy loam, 3 to 5 percent slopes
LitC2	Littleaxe fine sandy loam, 3 to 5 percent slopes, eroded

SYMBOL	NAME
LomA	Lomill silty clay loam, 0 to 1 percent slopes, occasionally flooded
LtUC	Littleaxe-Urban land complex, 1 to 5 percent slopes
LweA	Lawrie silty clay loam, 0 to 1 percent slopes, occasionally flooded
LwfA	Lawrie fine sandy loam, 0 to 1 percent slopes, occasionally flooded
LwUA	Lawrie-Urban land complex, 0 to 1 percent slopes, rarely flooded
MlfA	Miller fine sandy loam, 0 to 1 percent slopes, occasionally flooded, overwash
MllA	Miller silty clay, 0 to 1 percent slopes, occasionally flooded
M-W	Miscellaneous water
NewB	Newalla fine sandy loam, 1 to 3 percent slopes
NewC2	Newalla fine sandy loam, 3 to 5 percent slopes, eroded
NorB	Norge silt loam, 1 to 3 percent slopes
NorC	Norge silt loam, 3 to 5 percent slopes
NorC2	Norge silt loam, 3 to 5 percent slopes, eroded
NoUC	Norge-Urban land complex, 1 to 5 percent slopes
PdHC	Piedmont-Huska complex, 1 to 5 percent slopes
PieC2	Piedmont silty clay loam, 3 to 5 percent slopes, eroded
PimB	Piedmont silt loam, 1 to 3 percent slopes
PimC	Piedmont silt loam, 3 to 5 percent slopes
PIT	Pits
PukA	Pulaski fine sandy loam, 0 to 1 percent slopes, frequently flooded
PulA	Pulaski fine sandy loam, 0 to 1 percent slopes, occasionally flooded
RenB	Renfrow silt loam, 1 to 3 percent slopes
RinB	Renthin silt loam, 1 to 3 percent slopes
RnnB	Renthin silty clay loam, 1 to 3 percent slopes
RnnC2	Renthin silty clay loam, 3 to 5 percent slopes, eroded
RnUC	Renthin-Urban land complex, 1 to 5 percent slopes
SDGD4	Stephenville-Darsil-Gullied land complex, 3 to 8 percent slopes
SDND	Stephenville-Darsil-Newalla complex, 3 to 8 percent slopes
SDND2	Stephenville-Darsil-Newalla complex, 3 to 8 percent slopes, eroded
StDC	Stephenville-Darsil complex, 1 to 5 percent slopes
StDC2	Stephenville-Darsil complex, 1 to 5 percent slopes, eroded
StLC4	Stephenville-Littleaxe complex, 1 to 5 percent slopes, gullied
SUND	Stephenville-Urban land-Newalla complex, 1 to 8 percent slopes
TevD	Teval loam, 3 to 8 percent slopes
TevD2	Teval loam, 3 to 8 percent slopes, eroded
TlrB	Teller fine sandy loam, 1 to 3 percent slopes
TlrC	Teller fine sandy loam, 3 to 5 percent slopes
TlrC2	Teller fine sandy loam, 3 to 5 percent slopes, eroded
TlrD	Teller fine sandy loam, 5 to 8 percent slopes
TlUD	Teller-Urban land complex, 1 to 8 percent slopes
TriA	Tribbey fine sandy loam, 0 to 1 percent slopes, frequently flooded
URB	Urban land
VanA	Vanoss silt loam, 0 to 1 percent slopes
VanB	Vanoss silt loam, 1 to 3 percent slopes
W	Water
WAT	Census water
WauA	Waurika silt loam, 0 to 1 percent slopes
WtgA	Watonga silty clay, 0 to 1 percent slopes, rarely flooded
WuUA	Watonga-Urban land complex, 0 to 1 percent slopes, rarely flooded
YaGA	Yahola-Gaddy complex, 0 to 1 percent slopes, occasionally flooded
YahA	Yahola fine sandy loam, 0 to 1 percent slopes, occasionally flooded
YaUA	Yahola-Urban land complex, 0 to 1 percent slopes, protected
ZanB	Zaneis loam, 1 to 3 percent slopes
ZanC	Zaneis loam, 3 to 5 percent slopes
ZanC2	Zaneis loam, 3 to 5 percent slopes, eroded
ZaUC	Zaneis-Urban land complex, 1 to 5 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Limit of soil survey (label)
- Field sheet matchline and neatline
- Previously Published Survey

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(sections and land grants)

ROAD EMBLEM & DESIGNATIONS

- Interstate (173)
- Federal (287)
- State (52)

LEVEES

- Without road

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Drainage end

MISCELLANEOUS WATER FEATURES

- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS

HiLA KeoA W GmtA

GULLY

MISCELLANEOUS

- Gravelly spot
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sodic spot

SCALE 1:12000

MILES

FEET

KILOMETERS

NORTH

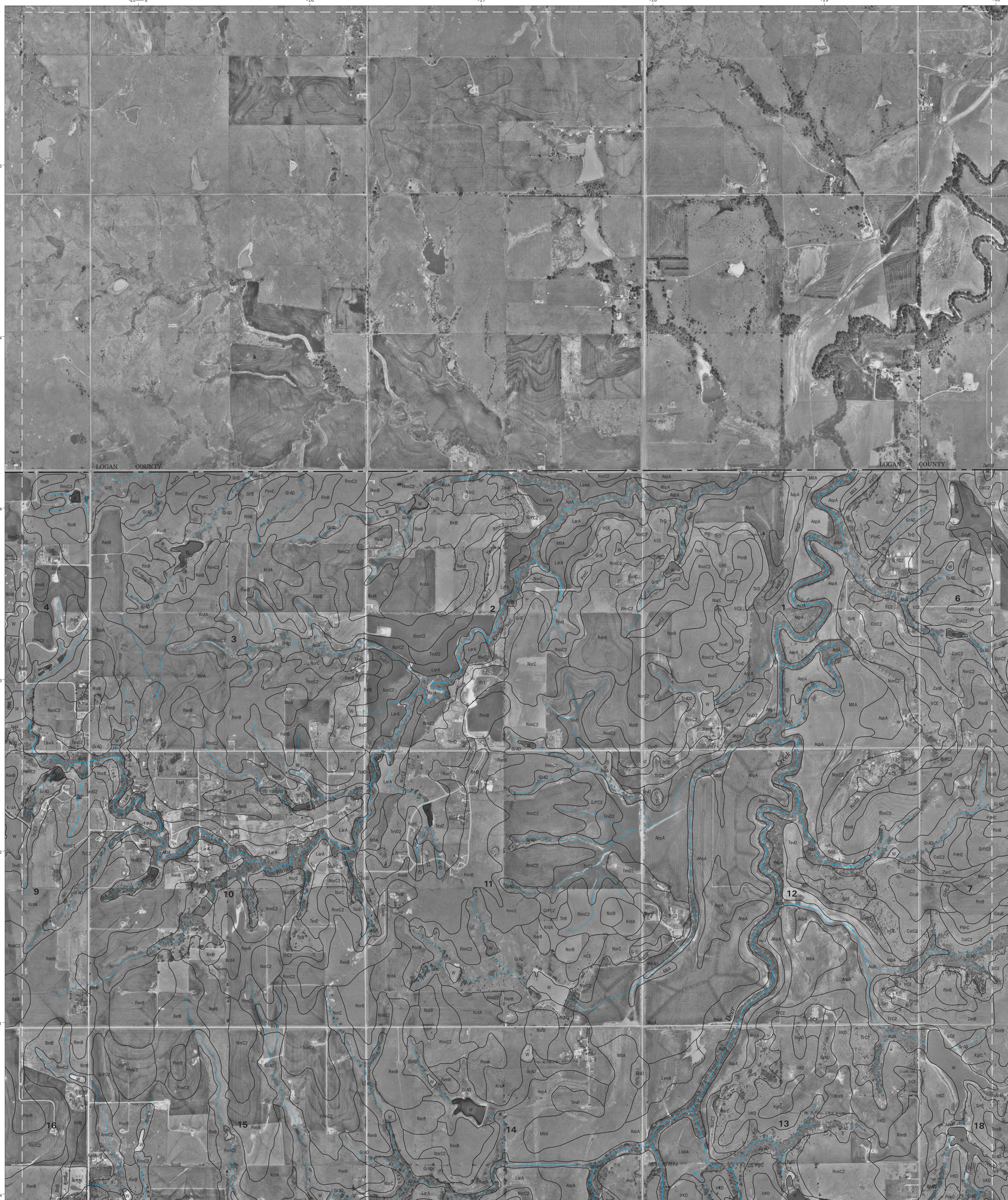
QUARTER QUADRANGLE LOCATION

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey.
The cultural and hydrography information were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets. Digital data are available for this quadrangle.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

97°37'30" — 97°33'45"
35°45'00"



35°41'15"
97°37'30" — 97°33'45"

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NORTH

SCALE 1:12000

MILES: 0.5 0 0.5
FEET: 500 0 500 1000 1500 2000 2500 3000 3500
KILOMETERS: 0.5 0 0.5

QUARTER QUADRANGLE LOCATION

BETHANY NE NW, OKLAHOMA
3.75 MINUTE SERIES

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
BETHANY NE NE QUADRANGLE
SHEET NUMBER 3 OF 54

Joins sheet 12, Bethany NE SE
SCALE 1:12000

MILES
FEET
KILOMETERS

NORTH

QUARTER QUADRANGLE LOCATION

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BETHANY NE NE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 3 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
EDMOND NW QUADRANGLE
SHEET NUMBER 4 OF 54

SCALE 1:12000

MILES
FEET
KILOMETERS

NORTH

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets. Digital data are available for this quadrangle.

QUARTER QUADRANGLE LOCATION

EDMOND NW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 4 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
EDMOND NE QUADRANGLE
SHEET NUMBER 5 OF 54

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey.
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North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 14.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets. Digital data are available for this quadrangle.

NORTH

SCALE 1:12000

0.5 — 0 — 0.5 MILES

500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500 FEET

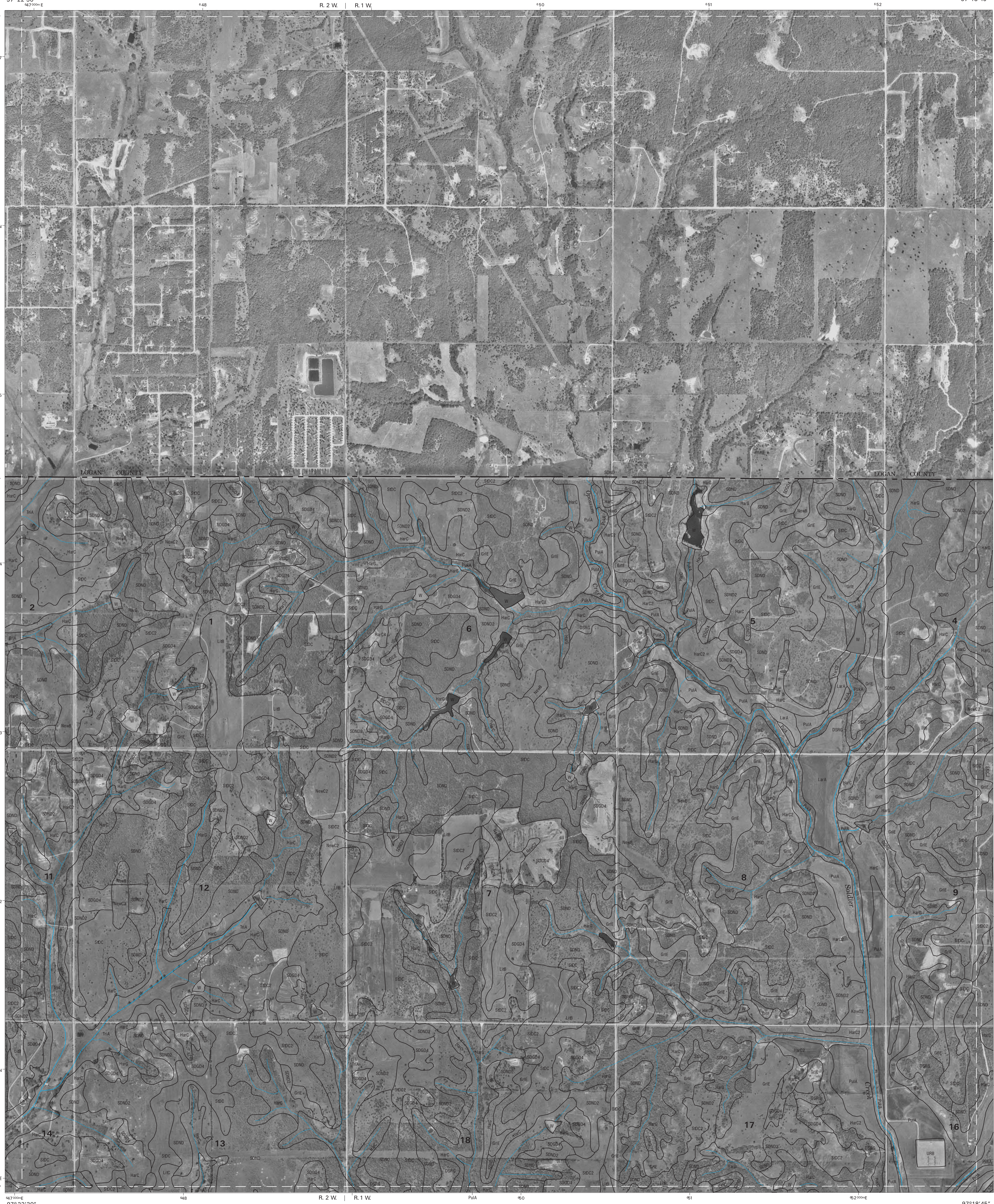
0.5 — 0 — 0.5 KILOMETERS

QUARTER QUADRANGLE LOCATION

EDMOND NE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 5 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
ARCADIA NW QUADRANGLE
SHEET NUMBER 6 OF 54



Joins sheet 15, Arcadia SW
SCALE 1:12000

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North American Datum of 1983 (NAD83). GRS-80 Spheroid
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NORTH

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

QUARTER QUADRANGLE LOCATION

ARCADIA NW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 6 OF 54

97°18′45″ R. 1 W. 97°15′00″

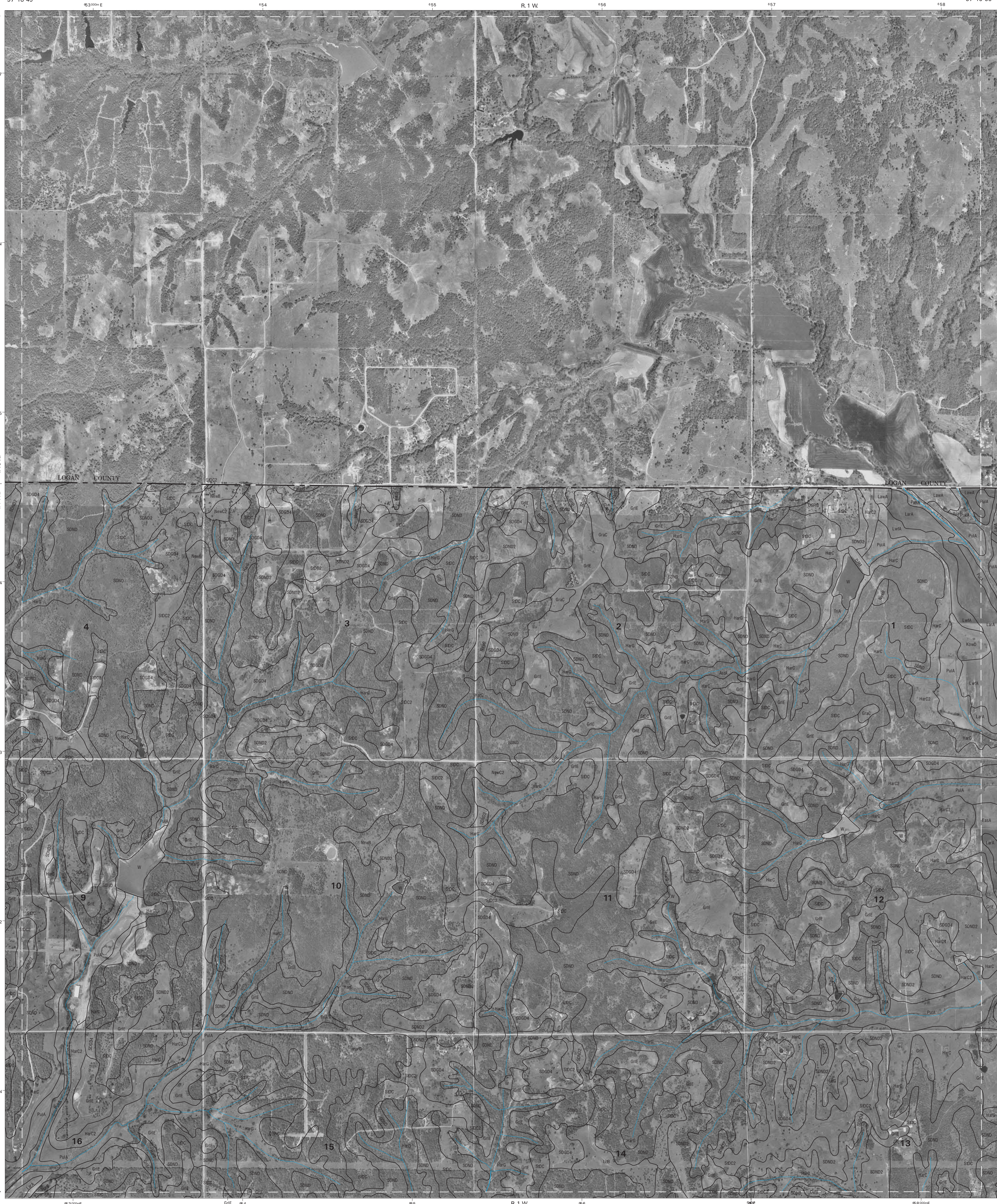
35° 45′00″

T. 15 N.

T. 14 N.

Joins sheet 6, Arcadia NW

Joins sheet 8, Luther NW



35° 41′15″

97°18′45″ R. 1 W. 97°15′00″

Joins sheet 16, Arcadia SE

SCALE 1:12000

MILES 0.5 0 0.5

FEET 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS 0.5 0 0.5

NORTH

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey.
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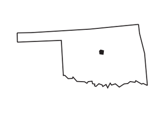
North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 14.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets. Digital data are available for this quadrangle.

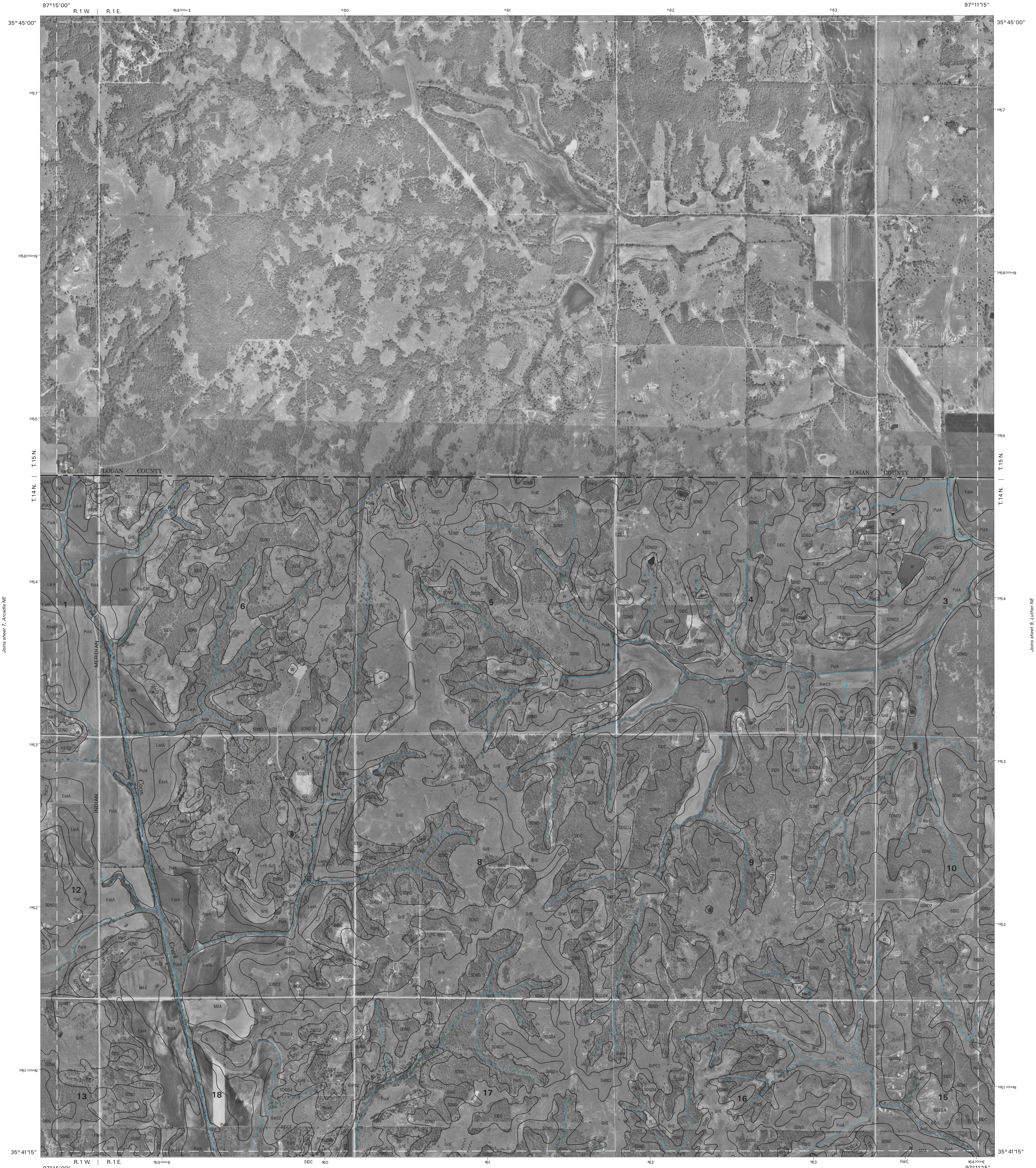


QUARTER QUADRANGLE
LOCATION

ARCADIA NE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 7 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
LUTHER NW QUADRANGLE
SHEET NUMBER 8 OF 54



Joins sheet 17, Luther SW
SCALE 1:12000

MILES
FEET
KILOMETERS
NORTH

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North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 14.
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QUARTER QUADRANGLE LOCATION

LUTHER NW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 8 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
LUTHER NE QUADRANGLE
SHEET NUMBER 9 OF 54

SCALE 1:12000

MILES FEET KILOMETERS

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey.
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North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 14.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

LUTHER NE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 9 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
PIEDMONT SE QUADRANGLE
SHEET NUMBER 10 OF 54

Joins sheet 1, Piedmont NE

97° 41'15" | R. 5 W. | R. 4 W. | 97° 37'30"

35° 41'15"

35° 37'30" | 97° 41'15" | R. 5 W. | R. 4 W. | 97° 37'30"

Joins sheet 19, Bethany NE
SCALE 1:12000

MILES
FEET
KILOMETERS

NORTH

QUARTER QUADRANGLE LOCATION

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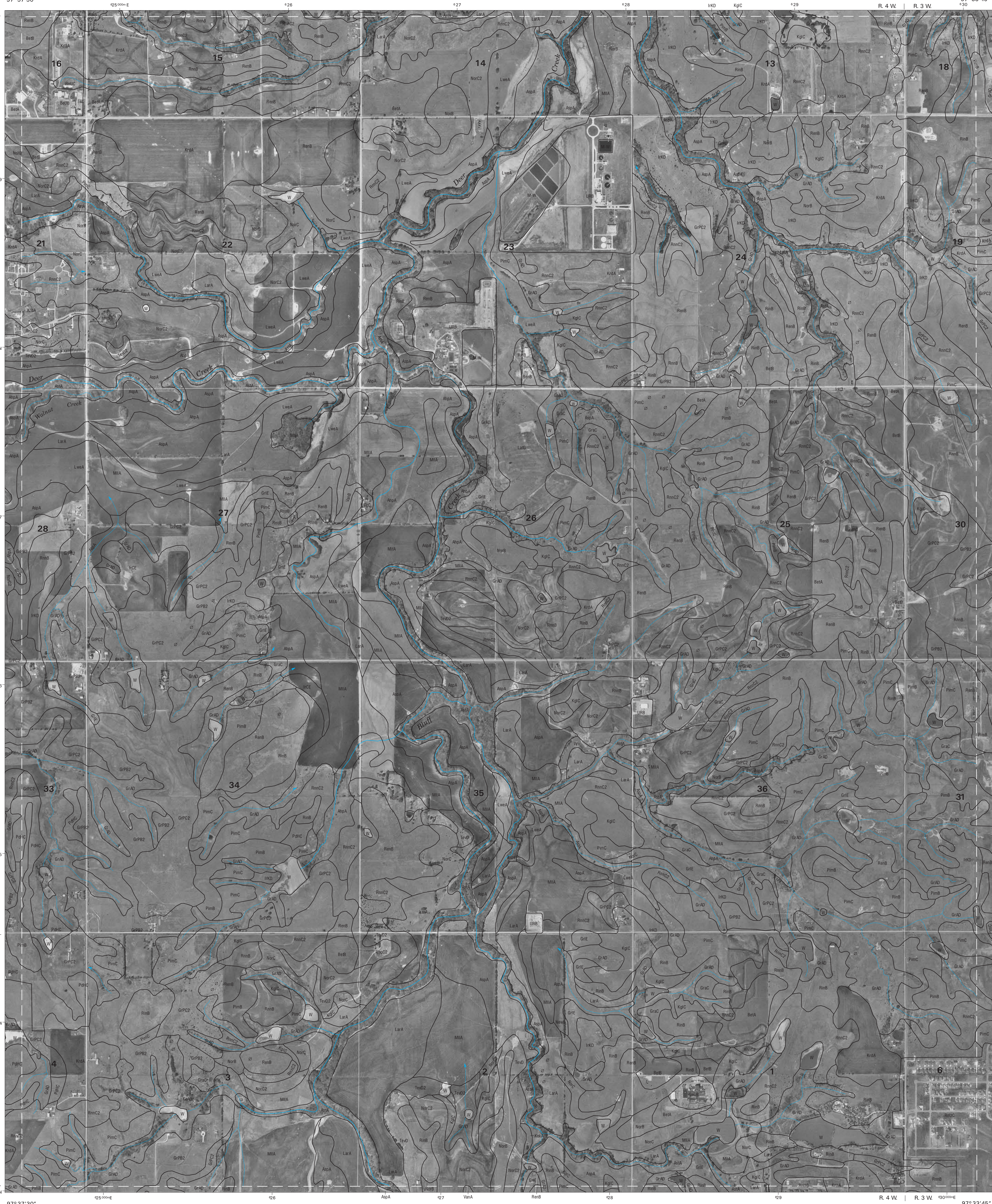
The cultural and hydrography information were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets. Digital data are available for this quadrangle.

PIEDMONT SE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 10 OF 54

Joins sheet 2, Bethany NE NW



Joins sheet 10, Piedmont SE

Joins sheet 12, Bethany NE SE

Joins sheet 20, Britton NW

SCALE 1:12000

MILES

FEET

KILOMETERS

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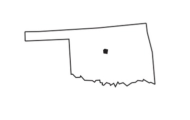
NORTH



QUARTER QUADRANGLE LOCATION

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
BETHANY NE SE QUADRANGLE
SHEET NUMBER 12 OF 54

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey.
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North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 14.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets. Digital data are available for this quadrangle.

SCALE 1:12000

MILES
FEET
KILOMETERS

NORTH

QUARTER QUADRANGLE
LOCATION

BETHANY NE SE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 12 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
EDMOND SW QUADRANGLE
SHEET NUMBER 13 OF 54

Joins sheet 4, Edmond NW

Joins sheet 12, Bethany NE SE

Joins sheet 14, Edmond SE

Joins sheet 22, Spencer NW

SCALE 1:12000

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey.
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North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 14.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets. Digital data are available for this quadrangle.

NORTH

MILES 0.5 0 0.5

FEET 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS 0.5 0 0.5

QUARTER QUADRANGLE LOCATION

EDMOND SW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 13 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
EDMOND SE QUADRANGLE
SHEET NUMBER 14 OF 54

Joins sheet 5, Edmond NE

97° 26′15″ | 35° 41′15″ | 97° 22′30″ | 35° 37′30″

Joins sheet 13, Edmond SW

Joins sheet 15, Arcadia SW

Joins sheet 23, Spencer NE

SCALE 1:12000

MILES — FEET — KILOMETERS

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NORTH

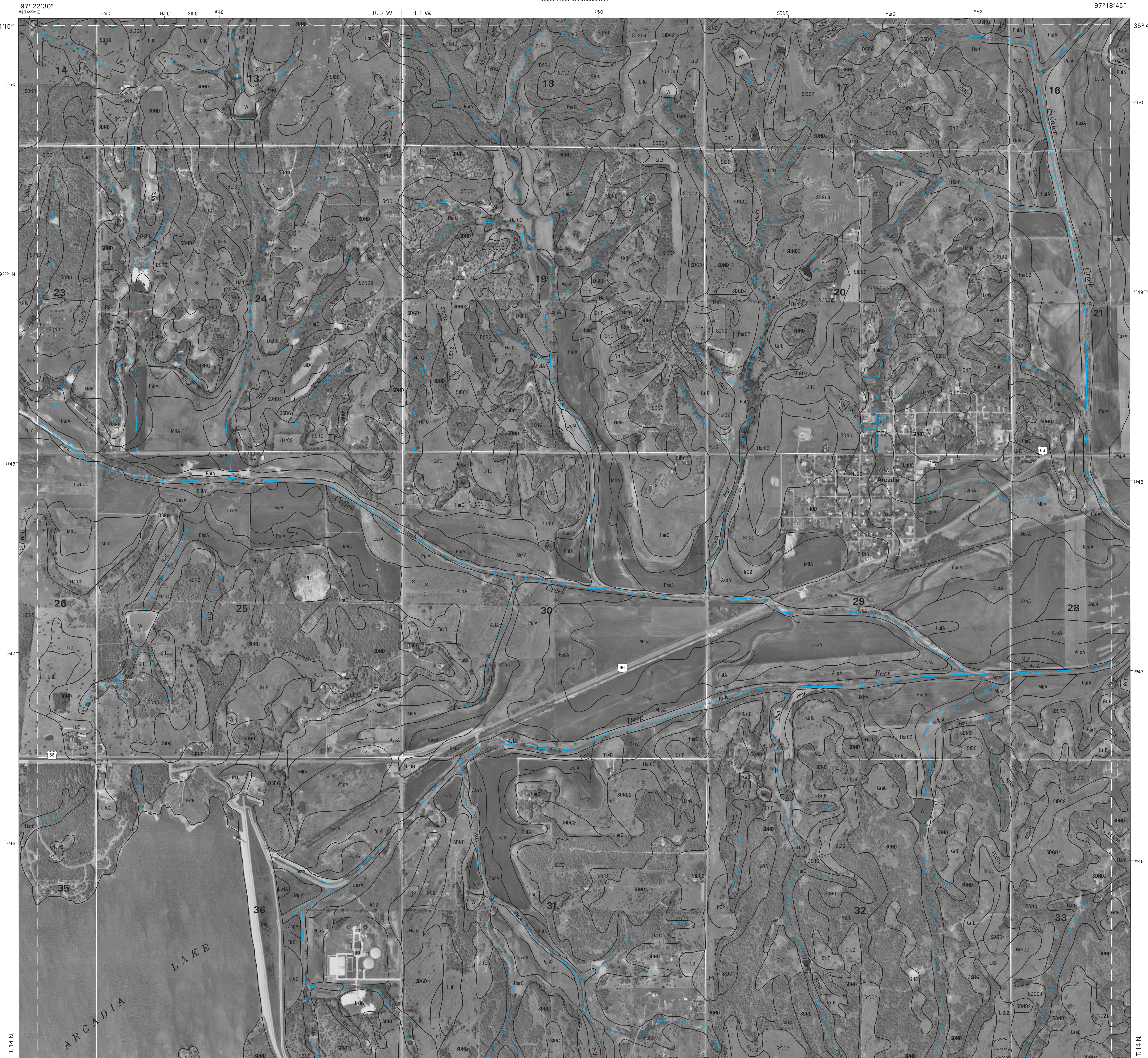
QUARTER QUADRANGLE LOCATION

EDMOND SE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 14 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
ARCADIA SW QUADRANGLE
SHEET NUMBER 15 OF 54

Joins sheet 6, Arcadia NW



Joins sheet 24, Jones NW

SCALE 1:12000

MILES 0.5 0 0.5

FEET 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS 0.5 0 0.5

NORTH

QUARTER QUADRANGLE LOCATION

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets. Digital data are available for this quadrangle.

ARCADIA SW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 15 OF 54

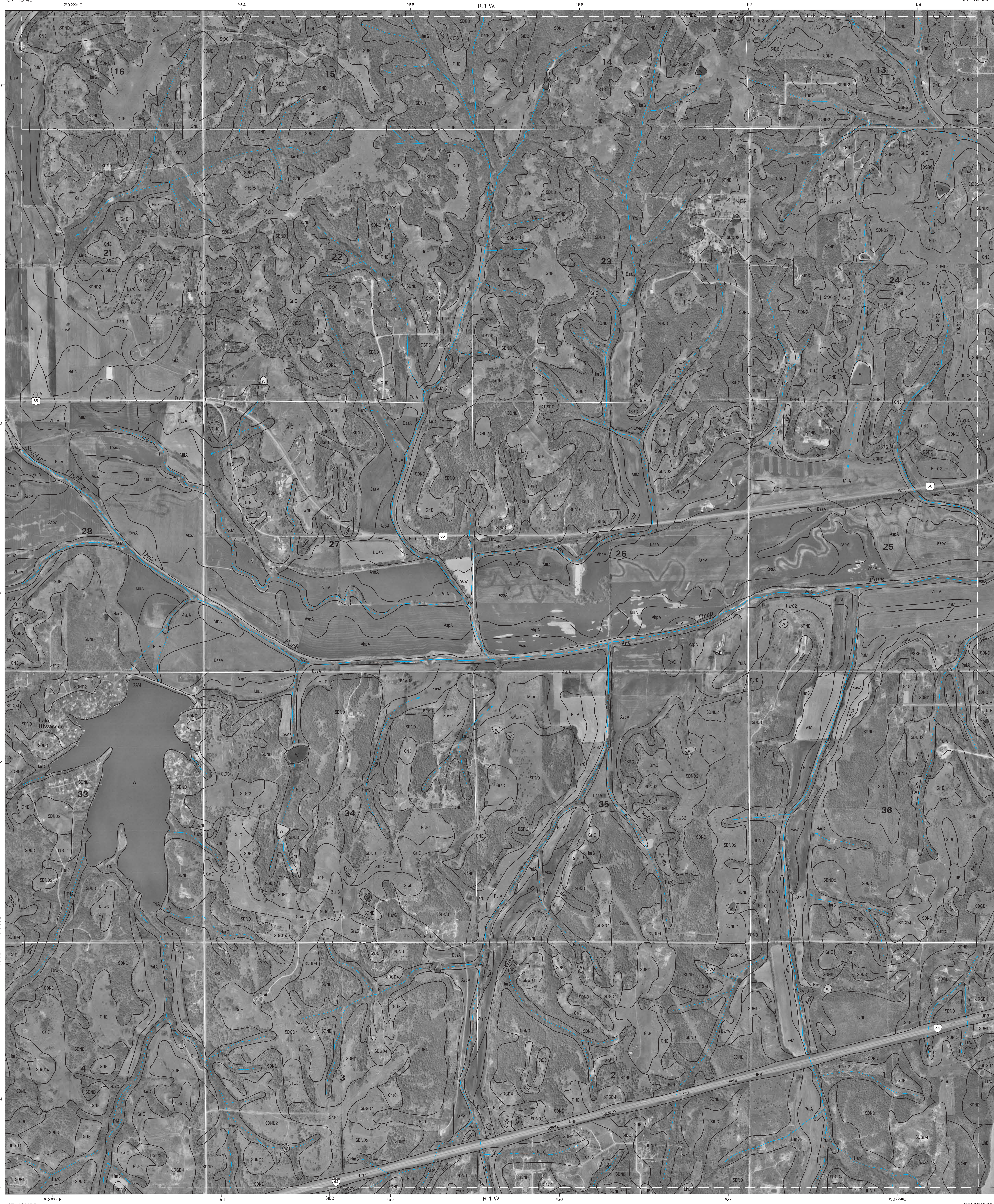
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
ARCADIA SE QUADRANGLE
SHEET NUMBER 16 OF 54

Joins sheet 7, Arcadia NE

97°18'45" ⁶53⁰⁰⁰ E ⁶54 ⁶55 R. 1 W. ⁶56 ⁶57 ⁶58 97°15'00"

35°41'15" 35°41'15"



Joins sheet 15, Arcadia SW

Joins sheet 17, Luther SW

35°37'30" 35°37'30"

97°18'45" ⁶53⁰⁰⁰ E ⁶54 ⁶55 R. 1 W. ⁶56 ⁶57 ⁶58⁰⁰⁰ E 97°15'00"

Joins sheet 25, Jones NE

SCALE 1:12000

MILES: 0.5 0 0.5

FEET: 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS: 0.5 0 0.5

NORTH

QUARTER QUADRANGLE LOCATION

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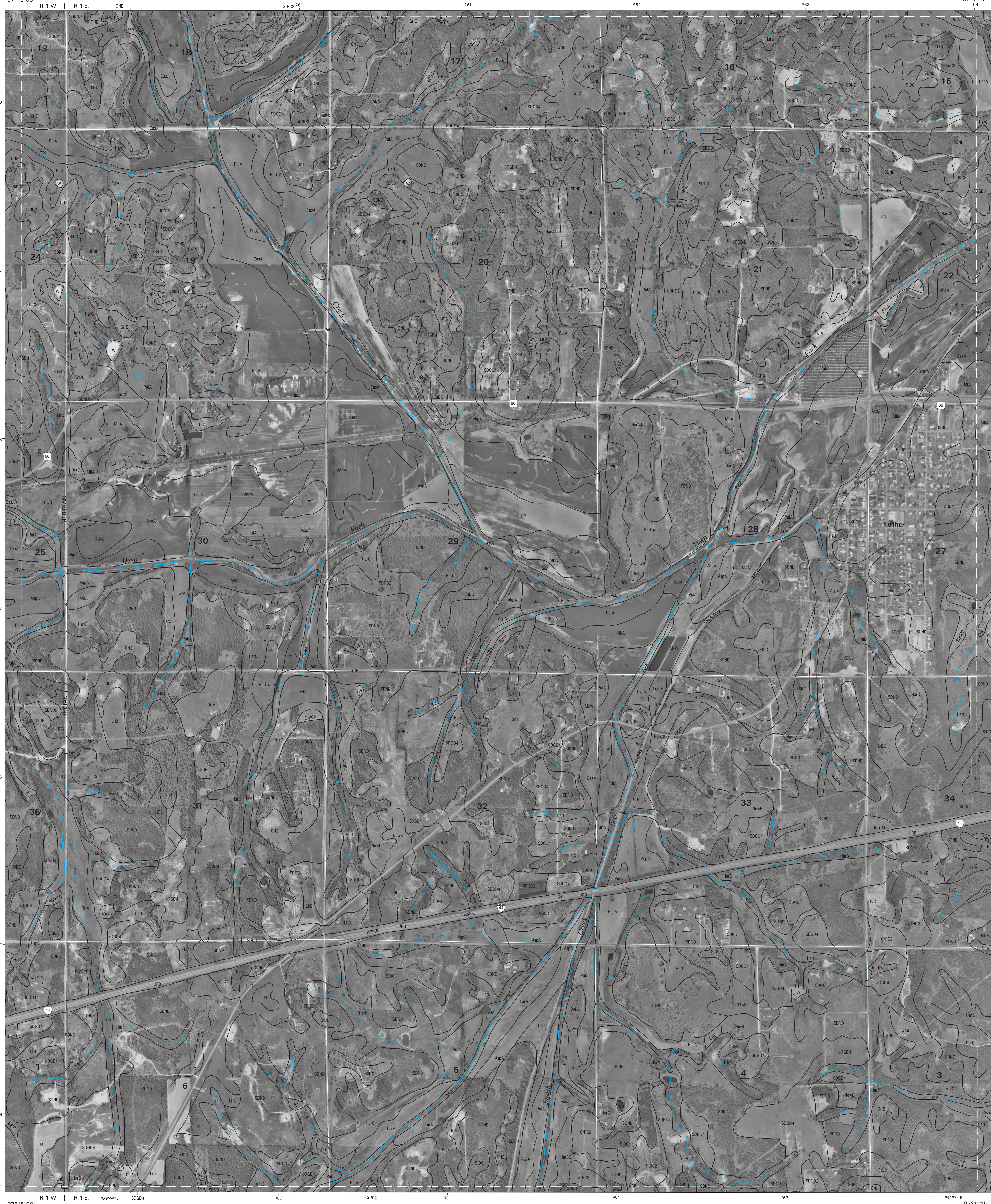
ARCADIA SE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 16 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
LUTHER SW QUADRANGLE
SHEET NUMBER 17 OF 54

Joins sheet 8, Luther NW



Joins sheet 16, Arcadia SE

Joins sheet 18, Luther SE

Joins sheet 26, Horseshoe Lake NW

SCALE 1:12000

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NORTH

MILES

FEET

KILOMETERS

QUARTER QUADRANGLE
LOCATION

LUTHER SW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 17 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
LUTHER SE QUADRANGLE
SHEET NUMBER 18 OF 54

Joins sheet 9, Luther NE

97°11′15″ ⁶64⁰⁰⁰ᵐE ⁶65 ⁶66 ⁶67 ⁶68 R. 1 E. | R. 2 E. ⁶69 97°07′30″

35°41′15″ 35°41′15″

Joins sheet 17, Luther SW

35°37′30″ 35°37′30″

SDND2 LarA 665000mE 666 667 668 R. 1 E. | R. 2 E. 669

97°11′15″ 97°07′30″

Joins sheet 27, Horseshoe Lake NE

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

NORTH

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QUARTER QUADRANGLE
LOCATION

LUTHER SE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 18 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
BETHANY NE QUADRANGLE
SHEET NUMBER 19 OF 54

Joins sheet 10, Piedmont SE

97° 41′15″ R. 5 W. | R. 4 W. 97° 37′30″

35° 37′30″ 35° 37′30″

35° 33′45″ 35° 33′45″

97° 41′15″ R. 5 W. | R. 4 W. 97° 37′30″

Joins sheet 20, Britton NW

Joins sheet 28, Bethany SE

SCALE 1:12000

MILES: 0.5 0 0.5

FEET: 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS: 0.5 0 0.5

NORTH

QUARTER QUADRANGLE LOCATION

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1000-meter ticks: Universal Transverse Mercator, zone 14.
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BETHANY NE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 19 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

SCALE 1:12000

MILES

FEET

KILOMETERS

NORTH

QUARTER QUADRANGLE LOCATION

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1000-meter ticks: Universal Transverse Mercator, zone 14.
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BRITTON NW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 20 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

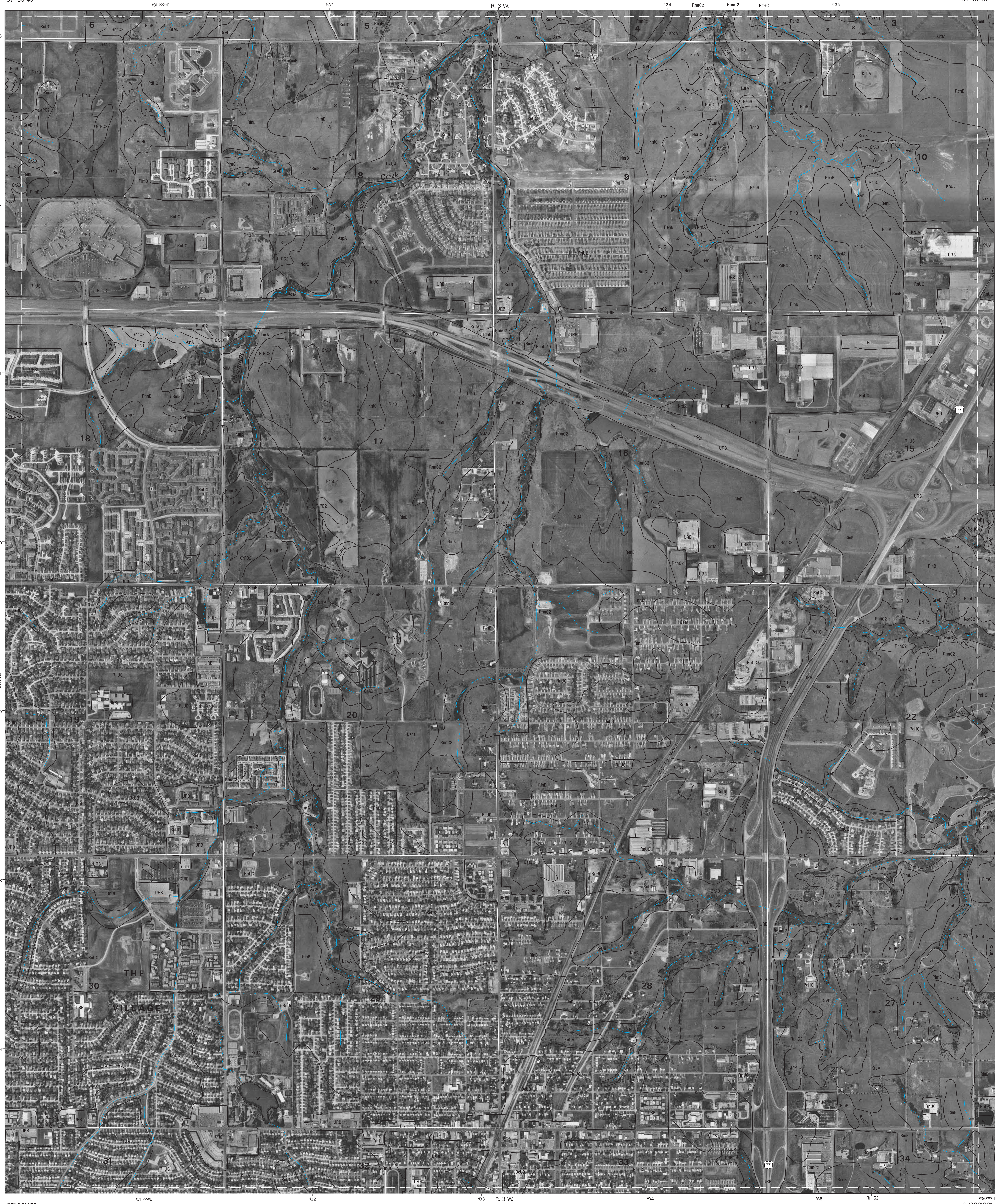
OKLAHOMA COUNTY, OKLAHOMA
BRITTON NE QUADRANGLE
SHEET NUMBER 21 OF 54

Joins sheet 12, Bethany NE SE

97° 33′ 45″ — 97° 30′ 00″

35° 37′ 30″

R. 3 W.



35° 33′ 45″

97° 33′ 45″ — 97° 30′ 00″

R. 3 W.

Joins sheet 20, Britton NW

Joins sheet 22, Spencer NW

T.13 N.

Joins sheet 30, Britton SE

SCALE 1:12000

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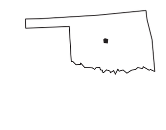
North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets. Digital data are available for this quadrangle.

NORTH

0.5 — 0 — 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 — 0 — 0.5
KILOMETERS



QUARTER QUADRANGLE
LOCATION

BRITTON NE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 21 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 13, Edmond SW

97° 30′00″ — 97° 26′15″
35° 37′30″ — 35° 33′45″
R. 3 W. | R. 2 W.
T. 13 N.

Joins sheet 21, Britton NE
Joins sheet 23, Spencer NE

Joins sheet 31, Spencer SW

SCALE 1:12000

0.5 — 0 — 0.5
MILES

500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500
FEET

0.5 — 0 — 0.5
KILOMETERS

NORTH

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey.
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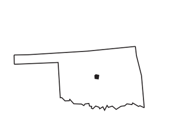
North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 14.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets. Digital data are available for this quadrangle.



QUARTER QUADRANGLE
LOCATION

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
SPENCER NE QUADRANGLE
SHEET NUMBER 23 OF 54

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

NORTH

QUARTER QUADRANGLE LOCATION

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey.
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North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 14.
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SPENCER NE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 23 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
JONES NW QUADRANGLE
SHEET NUMBER 24 OF 54

Joins sheet 14, Edmond SE

Joins sheet 15, Arcadia SW

Joins sheet 16, Arcadia SE

97° 22′30″

97° 18′45″

35° 37′30″

Joins sheet 23, Spencer NE

Joins sheet 25, Jones NE

35° 33′45″

97° 22′30″

97° 18′45″

Joins sheet 32, Spencer SE

Joins sheet 33, Jones SW

Joins sheet 34, Jones SE

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

NORTH

QUARTER QUADRANGLE
LOCATION

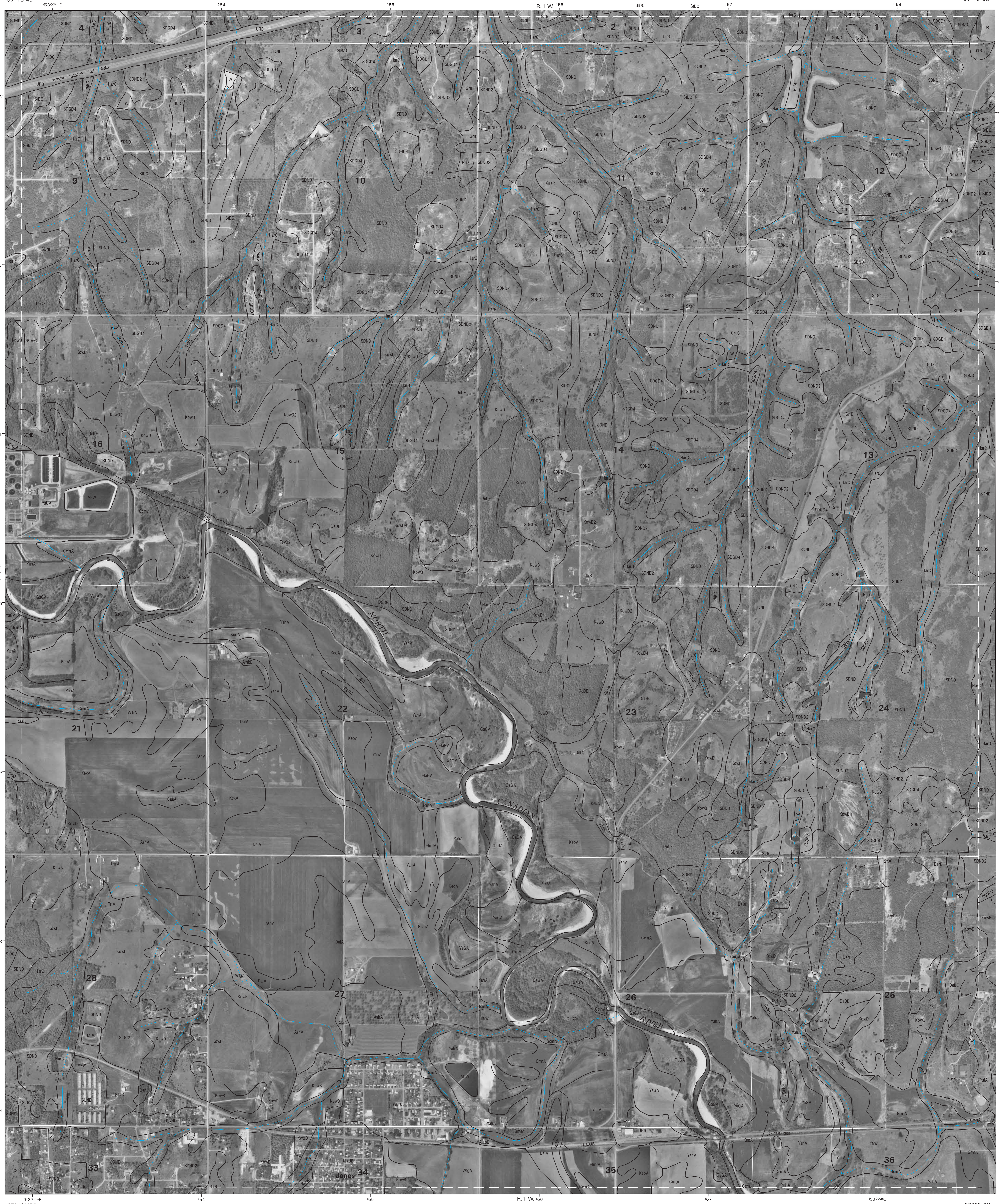
JONES NW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 24 OF 54

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey.
The cultural and hydrography information were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets. Digital data are available for this quadrangle.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
JONES NE QUADRANGLE
SHEET NUMBER 25 OF 54



SCALE 1:12000

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

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NORTH

QUARTER QUADRANGLE LOCATION

JONES NE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 25 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

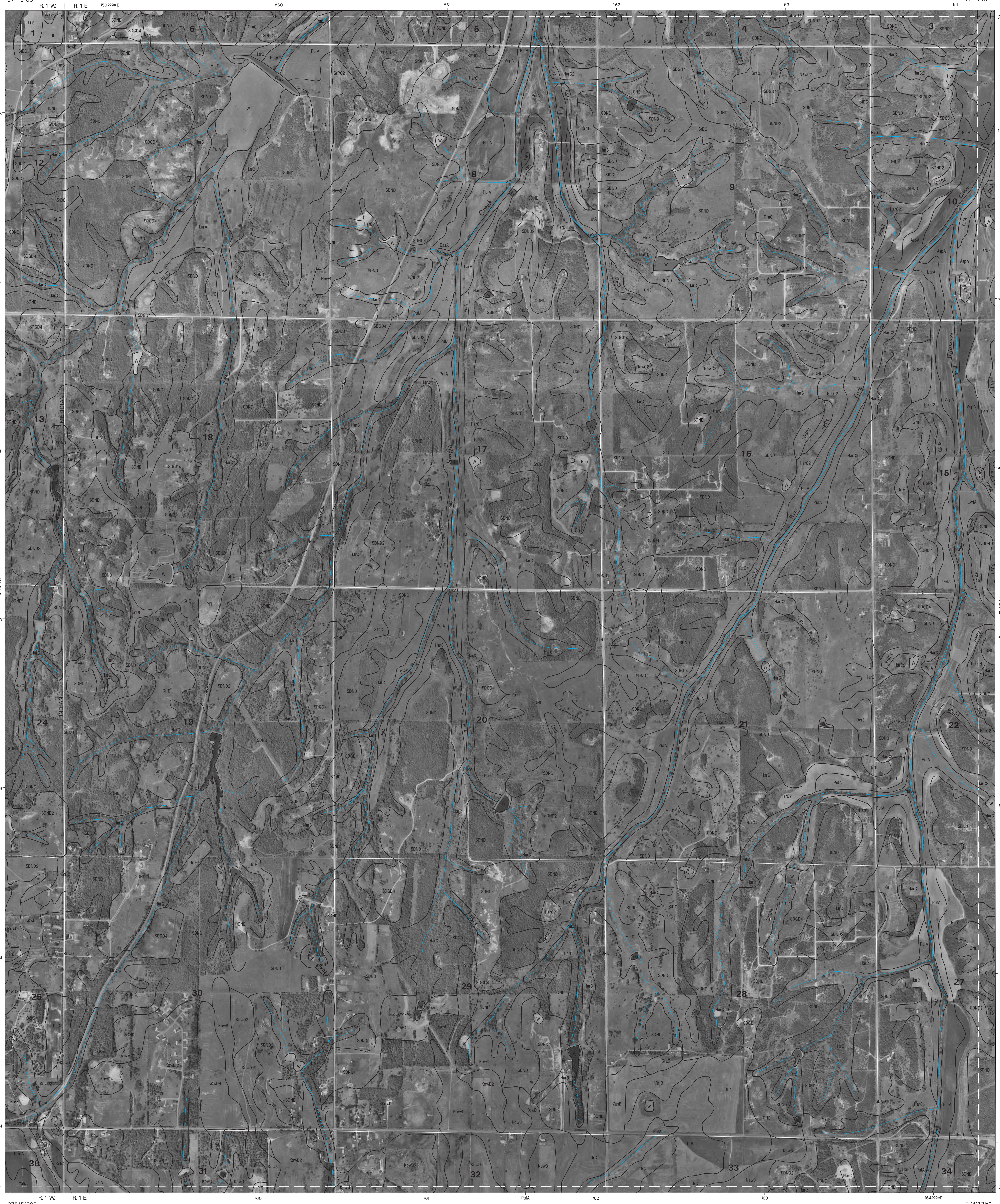
OKLAHOMA COUNTY, OKLAHOMA
HORSESHOE LAKE NW QUADRANGLE
SHEET NUMBER 26 OF 54

Joins sheet 17, Luther SW

97°15′00″ R. 1 W. | R. 1 E.

97°11′15″

35°37′30″



Joins sheet 25, Jones NE

Joins sheet 27, Horseshoe Lake NE

35°33′45″

R. 1 W. | R. 1 E.

97°15′00″ 97°11′15″

Joins sheet 35, Horseshoe Lake SW

SCALE 1:12000

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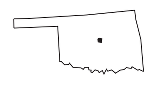
NORTH

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

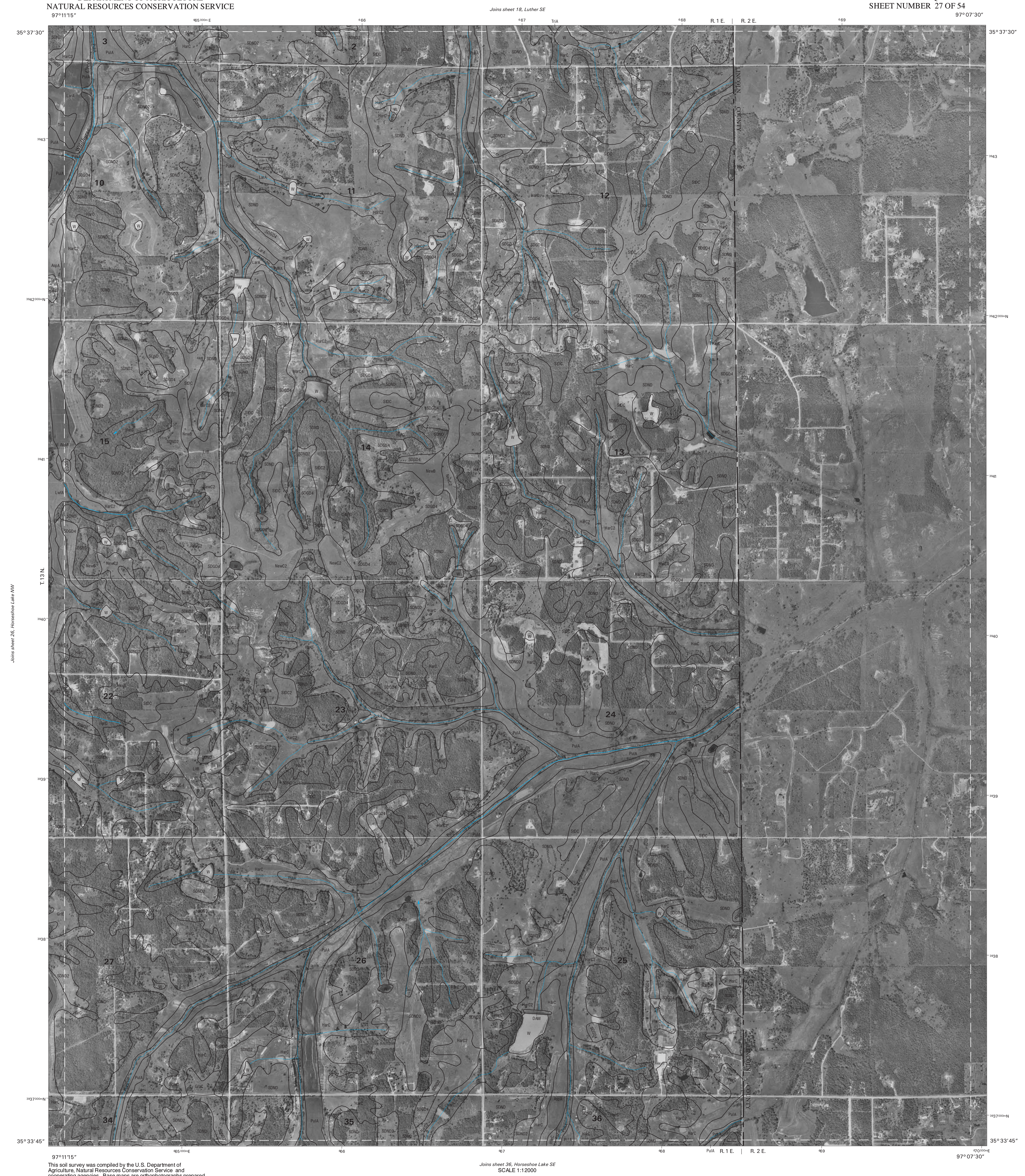
0.5 0 0.5
KILOMETERS



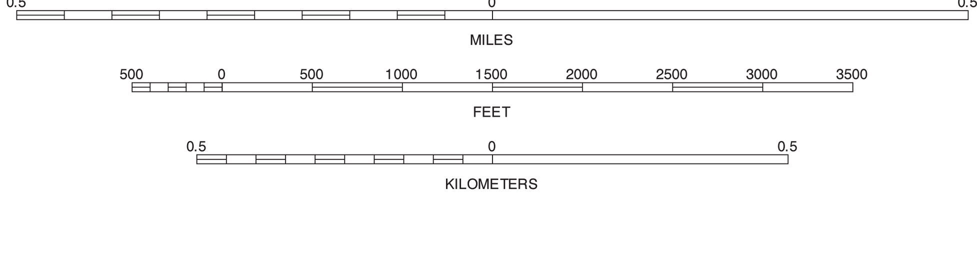
QUARTER QUADRANGLE
LOCATION

HORSESHOE LAKE NW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 26 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



SCALE 1:12000



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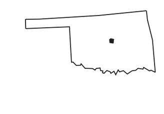

QUARTER QUADRANGLE
LOCATION

HORSESHOE LAKE NE, OKLAHOMA
3.75 MINUTE SERIES

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
BETHANY SE QUADRANGLE
SHEET NUMBER 28 OF 54

Joins sheet 19, Bethany NE

Joins sheet 20, Britton NW

Joins sheet 29, Britton SW

Joins sheet 37, Mustang NE

Joins sheet 38, Oklahoma City NW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey.
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NORTH

SCALE 1:12000

MILES: 0.5 0 0.5

FEET: 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS: 0.5 0 0.5

QUARTER QUADRANGLE LOCATION

BETHANY SE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 28 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
BRITTON SW QUADRANGLE
SHEET NUMBER 29 OF 54

Joins sheet 20, Britton NW

97°37′30″ | 35°33′45″ | R. 4 W. | R. 3 W. | 97°33′45″

Joins sheet 28, Bethany SE

Joins sheet 30, Britton SE

35°30′00″ | 97°37′30″ | R. 4 W. | R. 3 W. | 97°33′45″

Joins sheet 38, Oklahoma City NW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey.
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NORTH

SCALE 1:12000

0.5 | 0 | 0.5
MILES

500 | 0 | 500 | 1000 | 1500 | 2000 | 2500 | 3000 | 3500
FEET

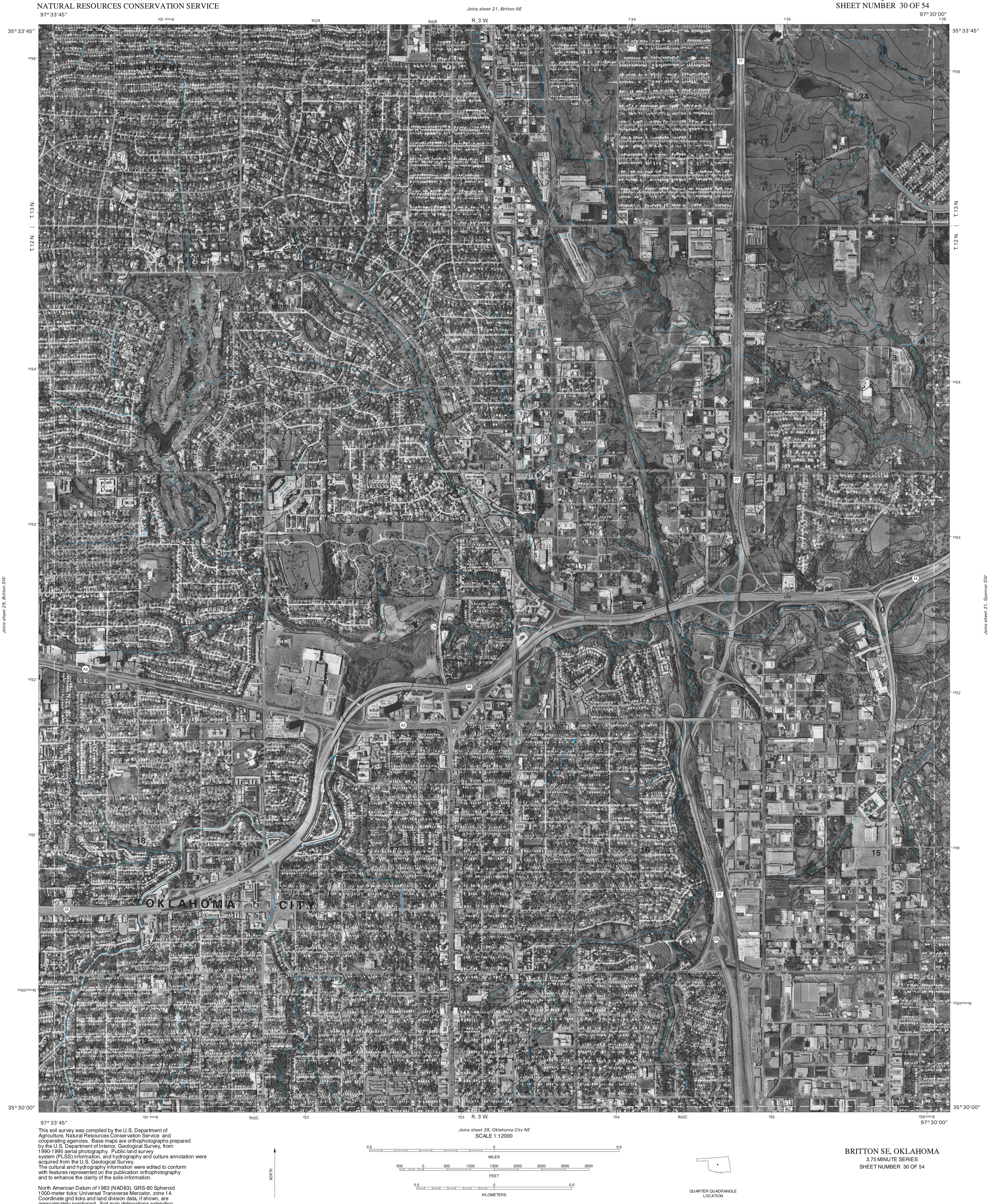
0.5 | 0 | 0.5
KILOMETERS

QUARTER QUADRANGLE LOCATION

BRITTON SW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 29 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
BRITTON SE QUADRANGLE
SHEET NUMBER 30 OF 54



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BRITTON SE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 30 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
SPENCER SW QUADRANGLE
SHEET NUMBER 31 OF 54

Joins sheet 22, Spencer NW

97° 30′00″ 97° 26′15″
35° 33′45″ 35° 33′45″

Joins sheet 30, Britton SE

Joins sheet 32, Spencer SE

35° 30′00″ 35° 30′00″
97° 30′00″ 97° 26′15″

Joins sheet 40, Midwest City NW

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

NORTH

QUARTER QUADRANGLE
LOCATION

SPENCER SW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 31 OF 54

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey.
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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
SPENCER SE QUADRANGLE
SHEET NUMBER 32 OF 54

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey.
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NORTH

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

QUARTER QUADRANGLE
LOCATION

SPENCER SE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 32 OF 54

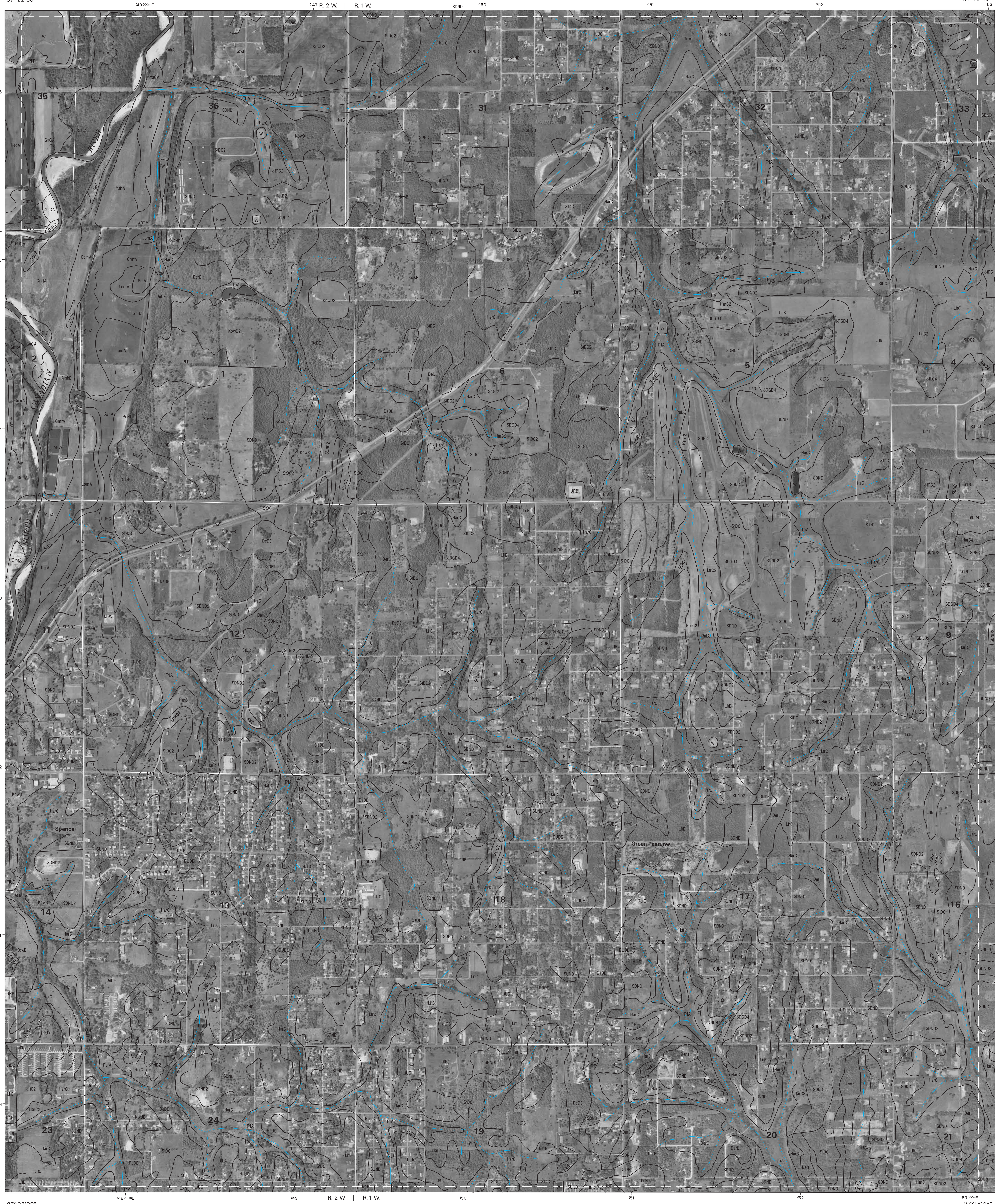
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
JONES SW QUADRANGLE
SHEET NUMBER 33 OF 54

Joins sheet 24, Jones NW

97°22′30″ 35°33′45″ — 97°18′45″ 35°33′45″

R. 2 W. | R. 1 W.



Joins sheet 32, Spencer SE

Joins sheet 34, Jones SE

35°30′00″ 97°22′30″ — 35°30′00″ 97°18′45″

R. 2 W. | R. 1 W.

Joins sheet 42, Choctaw NW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey.
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NORTH

SCALE 1:12000

MILES: 0.5 0 0.5

FEET: 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS: 0.5 0 0.5

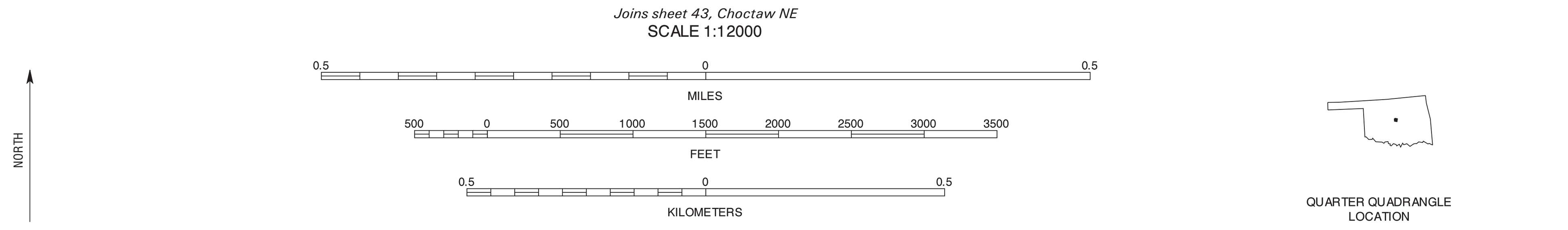
QUARTER QUADRANGLE LOCATION

JONES SW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 33 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
JONES SE QUADRANGLE
SHEET NUMBER 34 OF 54

SCALE 1:12000



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JONES SE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 34 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
HORSESHOE LAKE SW QUADRANGLE
SHEET NUMBER 35 OF 54

Joins sheet 26, Horseshoe Lake NW

97°15'00" R. 1 W. | R. 1 E. 97°11'15"

35° 33'45"

Joins sheet 34, Jones SE

Joins sheet 36, Horseshoe Lake SE

35° 30'00" R. 1 W. | R. 1 E. 35° 30'00"

97°15'00" 97°11'15"

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey.
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NORTH

Joins sheet 44, Harrah NW

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

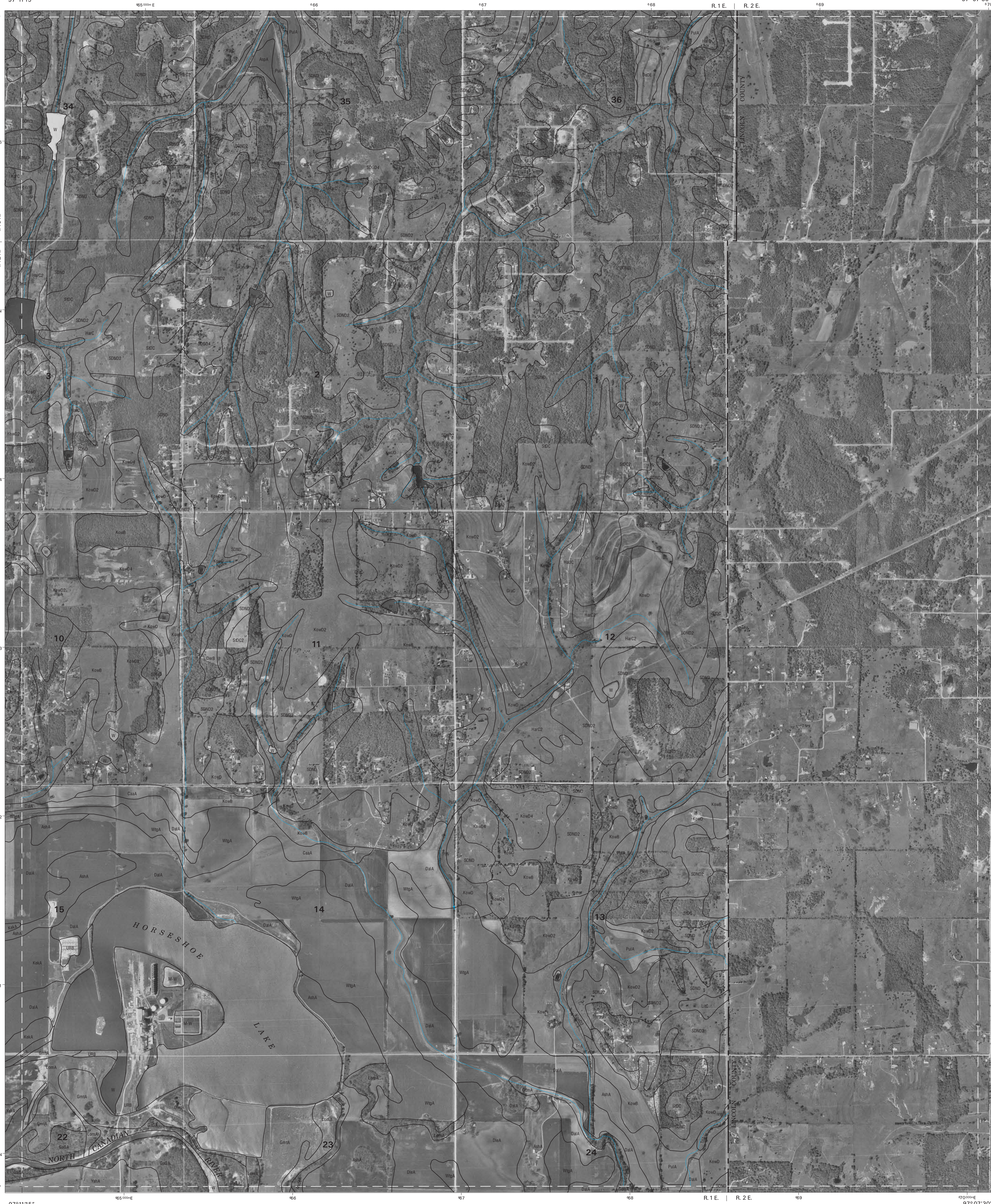
QUARTER QUADRANGLE
LOCATION

HORSESHOE LAKE SW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 35 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
HORSESHOE LAKE SE QUADRANGLE
SHEET NUMBER 36 OF 54

Joins sheet 27, Horseshoe Lake NE



Joins sheet 45, Harrah NE

SCALE 1:12000

MILES

FEET

KILOMETERS

NORTH

QUARTER QUADRANGLE LOCATION

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HORSESHOE LAKE SE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 36 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
MUSTANG NE QUADRANGLE
SHEET NUMBER 37 OF 54

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey.
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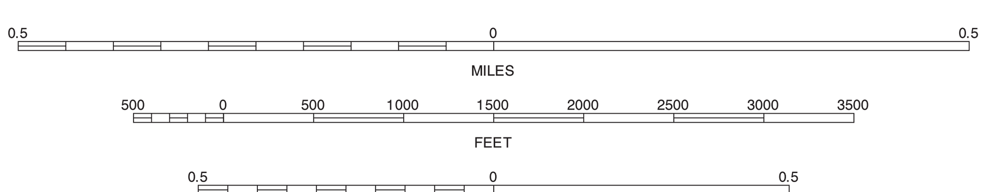
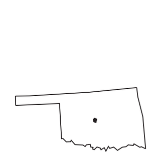
NORTH

SCALE 1:12000





QUARTER QUADRANGLE
LOCATION

MUSTANG NE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 37 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
OKLAHOMA CITY NW QUADRANGLE
SHEET NUMBER 38 OF 54

Joins sheet 29, Britton SW

97° 37′ 30″ | 97° 33′ 45″
35° 30′ 00″ | 35° 30′ 00″

R. 4 W. | R. 3 W.

Joins sheet 37, Mustang NE

Joins sheet 39, Oklahoma City NE

35° 26′ 15″ | 35° 26′ 15″
97° 37′ 30″ | 97° 33′ 45″

R. 4 W. | R. 3 W.

Joins sheet 47, Oklahoma City SW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey. The cultural and hydrography information were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets. Digital data are available for this quadrangle.

NORTH

SCALE 1:12000

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

QUARTER QUADRANGLE LOCATION

OKLAHOMA CITY NW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 38 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
OKLAHOMA CITY NE QUADRANGLE
SHEET NUMBER 39 OF 54

Joins sheet 30, Britton SE

97° 33′ 45″ — R. 3 W. — 97° 30′ 00″

35° 30′ 00″

Joins sheet 38, Oklahoma City NW — T. 12 N. / T. 11 N.

Joins sheet 40, Midwest City NW — T. 12 N. / T. 11 N.

35° 26′ 15″

97° 33′ 45″ — R. 3 W. — 97° 30′ 00″

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NORTH

Joins sheet 48, Oklahoma City SE

SCALE 1:12000

MILES: 0.5 — 0 — 0.5

FEET: 500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500

KILOMETERS: 0.5 — 0 — 0.5

QUARTER QUADRANGLE LOCATION

OKLAHOMA CITY NE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 39 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
MIDWEST CITY NW QUADRANGLE
SHEET NUMBER 40 OF 54

Joins sheet 31, Spencer SW

97° 30′00″ — 97° 26′15″

35° 30′00″

35° 26′15″

Joins sheet 39, Oklahoma City NE

Joins sheet 41, Midwest City NE

T. 12 N. | T. 11 N.

R. 3 W. | R. 2 W.

97° 30′00″ — 97° 26′15″

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1000-meter ticks: Universal Transverse Mercator, zone 14.
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NORTH

Joins sheet 49, Midwest City SW

SCALE 1:12000

0.5 — 0 — 0.5 MILES

500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500 FEET

0.5 — 0 — 0.5 KILOMETERS

QUARTER QUADRANGLE LOCATION

MIDWEST CITY NW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 40 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
MIDWEST CITY NE QUADRANGLE
SHEET NUMBER 41 OF 54

Joins sheet 32, Spencer SE

97° 26′15″ | R. 2 W. | 97° 22′30″

35° 30′00″ | 35° 30′00″

Joins sheet 40, Midwest City NW

Joins sheet 42, Choctaw NW

T. 12 N.
T. 11 N.

35° 26′15″ | R. 2 W. | 35° 26′15″

97° 26′15″ | 97° 22′30″

Joins sheet 50, Midwest City SE

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

NORTH

QUARTER QUADRANGLE LOCATION

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North American Datum of 1983 (NAD83). GRS-80 Spheroid
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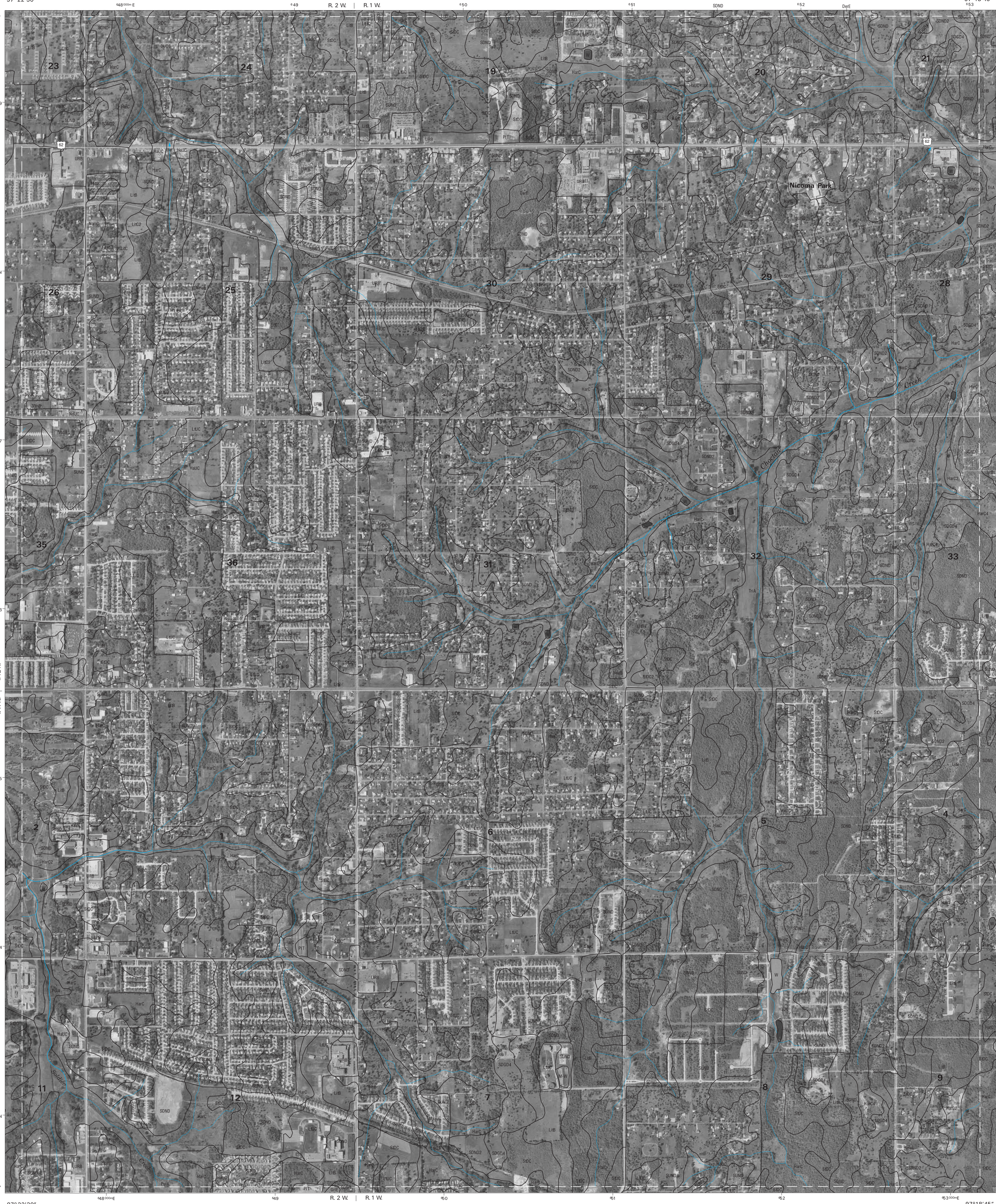
MIDWEST CITY NE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 41 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
CHOCTAW NW QUADRANGLE
SHEET NUMBER 42 OF 54



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NORTH

SCALE 1:12000

MILES

FEET

KILOMETERS

QUARTER QUADRANGLE LOCATION

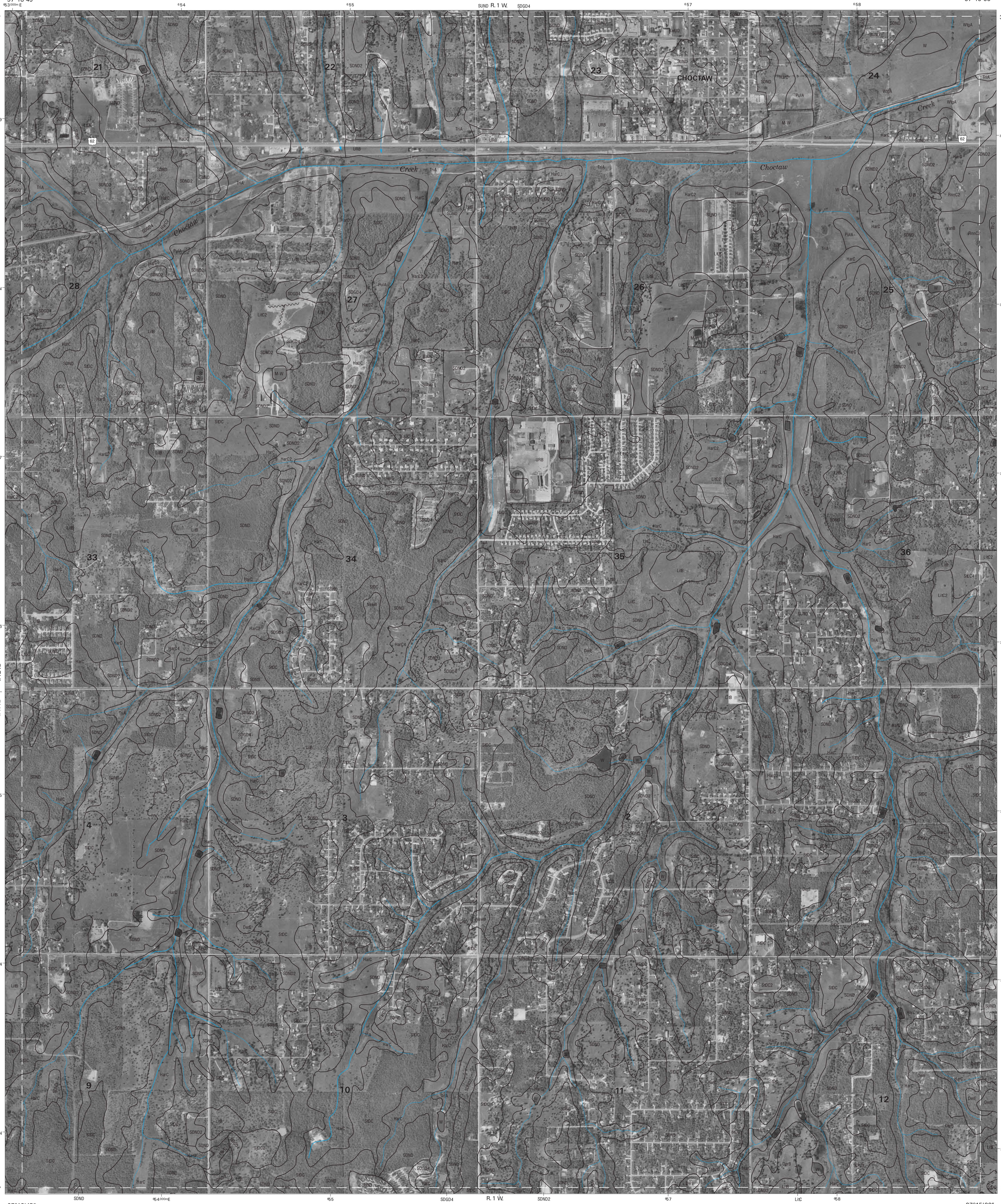
CHOCTAW NW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 42 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
CHOCTAW NE QUADRANGLE
SHEET NUMBER 43 OF 54

Joins sheet 34, Jones SE

97°18′45″ — 97°15′00″
35°30′00″



Joins sheet 42, Choctaw NW

Joins sheet 44, Harrah NW

35°26′15″
97°18′45″ — 97°15′00″

Joins sheet 52, Choctaw SE

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NORTH

SCALE 1:12000

0.5 — 0 — 0.5
MILES

500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500
FEET

0.5 — 0 — 0.5
KILOMETERS

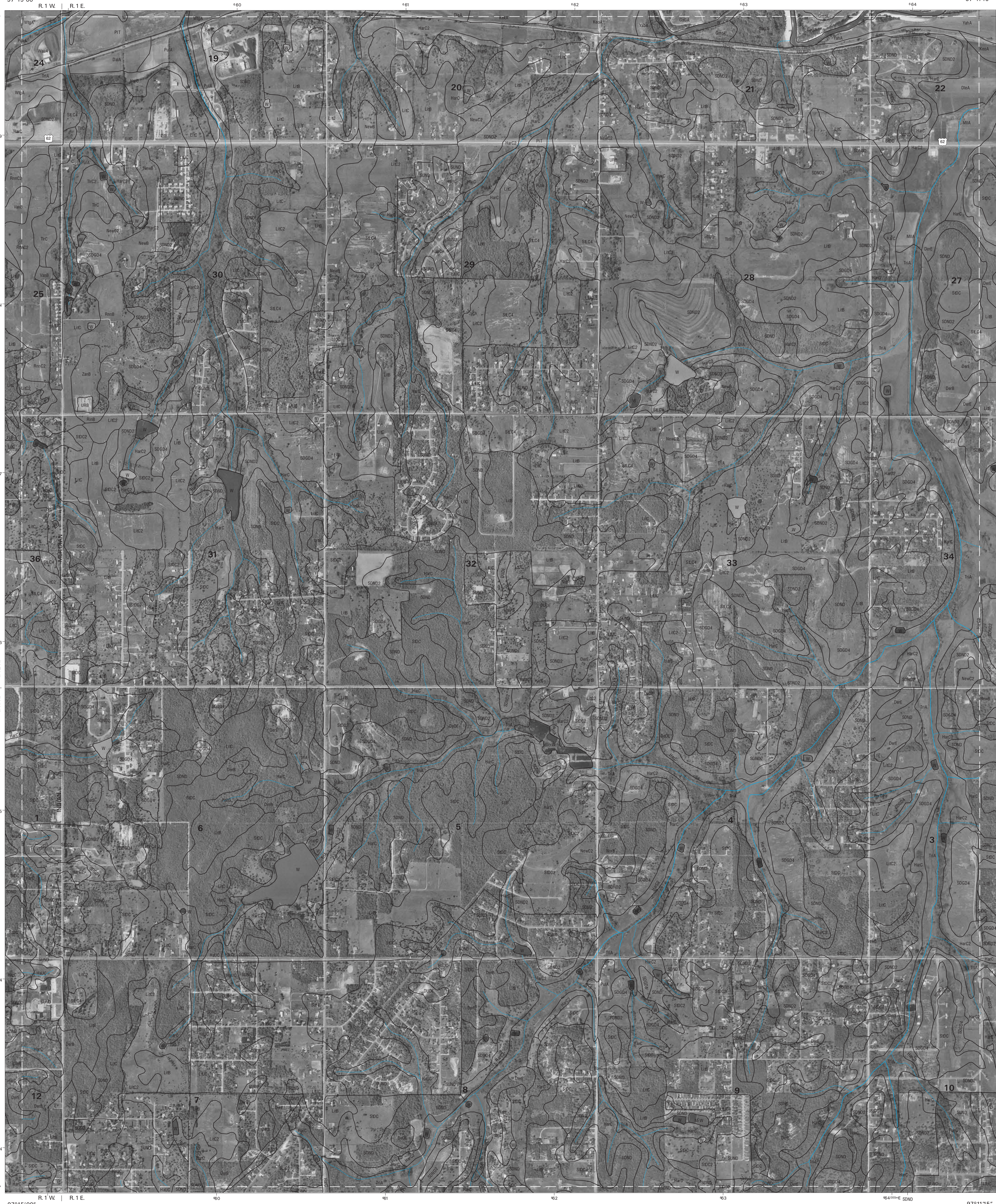
QUARTER QUADRANGLE LOCATION

CHOCTAW NE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 43 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
HARRAH NW QUADRANGLE
SHEET NUMBER 44 OF 54

Joins sheet 35, Horseshoe Lake SW



Joins sheet 43, Choctaw NE

Joins sheet 45, Harrah NE

Joins sheet 53, Harrah SW

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

NORTH

QUARTER QUADRANGLE
LOCATION

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HARRAH NW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 44 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
HARRAH NE QUADRANGLE
SHEET NUMBER 45 OF 54

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey. The cultural and hydrography information were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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NORTH

SCALE 1:12000

MILES

FEET

KILOMETERS

QUARTER QUADRANGLE LOCATION

HARRAH NE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 45 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
MUSTANG SE QUADRANGLE
SHEET NUMBER 46 OF 54

Joins sheet 37, Mustang NE

97° 41′15″ | R. 5 W. | R. 4 W. | 97° 37′30″

35° 26′15″

Joins sheet 47, Oklahoma City SW

35° 22′30″

97° 41′15″ | R. 5 W. | R. 4 W. | 97° 37′30″

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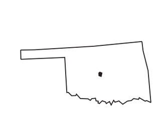
NORTH

SCALE 1:12000

0.5 — 0 — 0.5 MILES

500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500 FEET

0.5 — 0 — 0.5 KILOMETERS



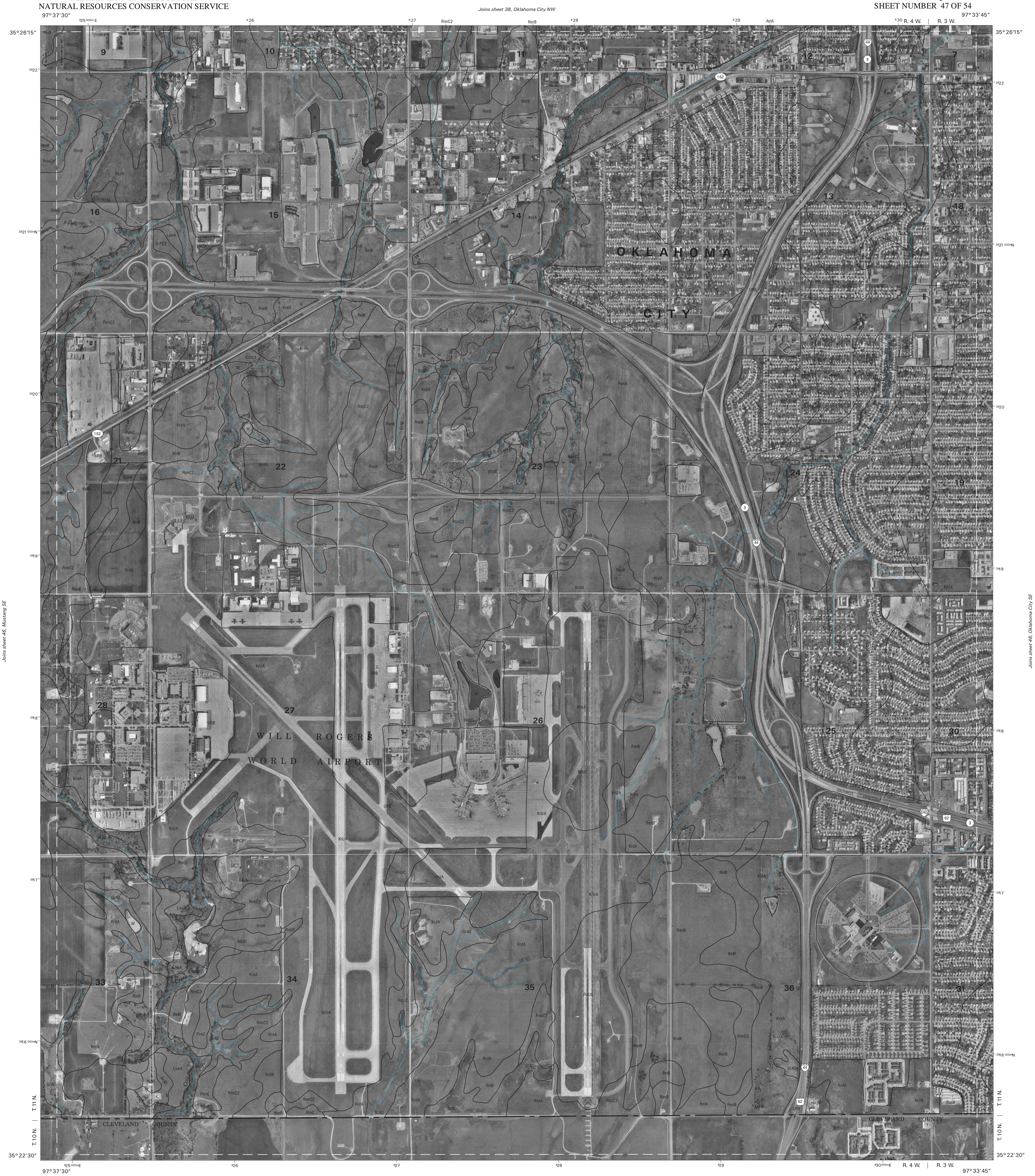
QUARTER QUADRANGLE
LOCATION

MUSTANG SE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 46 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
OKLAHOMA CITY SW QUADRANGLE
SHEET NUMBER 47 OF 54

Joins sheet 38, Oklahoma City NW



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NORTH

SCALE 1:12000

MILES

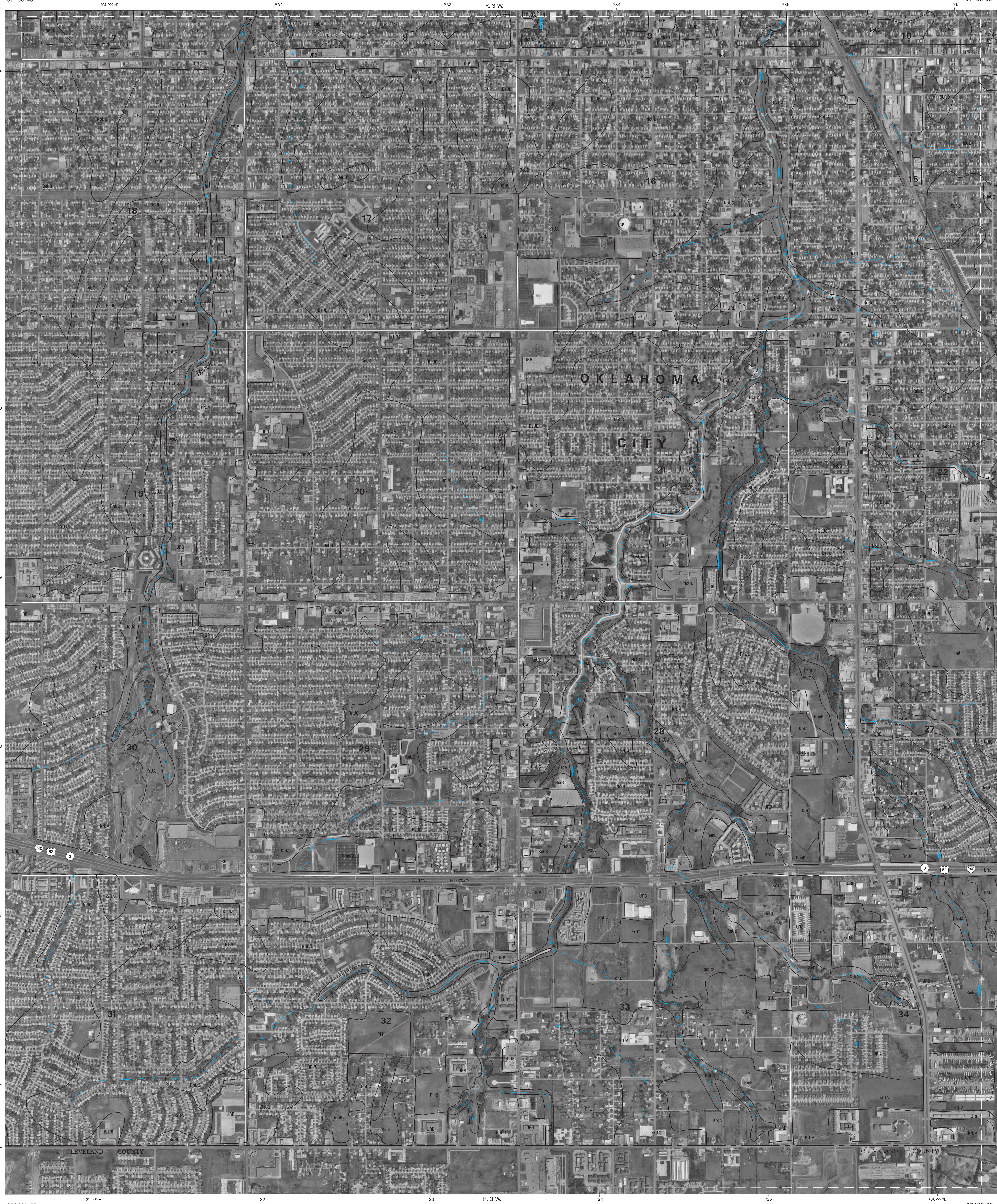
FEET

KILOMETERS

QUARTER QUADRANGLE LOCATION

OKLAHOMA CITY SW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 47 OF 54

Joins sheet 39, Oklahoma City NE



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NORTH

SCALE 1:12000

0.5 | 0 | 0.5 — MILES

500 | 0 | 500 | 1000 | 1500 | 2000 | 2500 | 3000 | 3500 — FEET

0.5 | 0 | 0.5 — KILOMETERS

QUARTER QUADRANGLE LOCATION

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
MIDWEST CITY SW QUADRANGLE
SHEET NUMBER 49 OF 54

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990-1995 aerial photography. Public land survey system (PLSS) information, and hydrography and culture annotation were acquired from the U.S. Geological Survey.
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NORTH

SCALE 1:12000

MILES: 0.5 0 0.5
FEET: 500 0 500 1000 1500 2000 2500 3000 3500
KILOMETERS: 0.5 0 0.5

QUARTER QUADRANGLE LOCATION

MIDWEST CITY SW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 49 OF 54

Joins sheet 41, Midwest City NE

97° 26′15″ 35° 26′15″ 97° 22′30″ 35° 26′15″

Joins sheet 49, Midwest City SW

Joins sheet 51, Choctaw SW

35° 22′30″ 97° 26′15″ 35° 22′30″ 97° 22′30″

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NORTH

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

QUARTER QUADRANGLE LOCATION

MIDWEST CITY SE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 50 OF 54

Joins sheet 42, Choctaw NW

97° 22′30″ | 97°18′45″

35° 26′15″

Joins sheet 50, Midwest City SE

Joins sheet 52, Choctaw SE

35° 22′30″

97° 22′30″ | 97°18′45″

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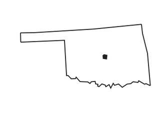
NORTH

SCALE 1:12000

MILES: 0.5 0 0.5
FEET: 500 0 500 1000 1500 2000 2500 3000 3500
KILOMETERS: 0.5 0 0.5

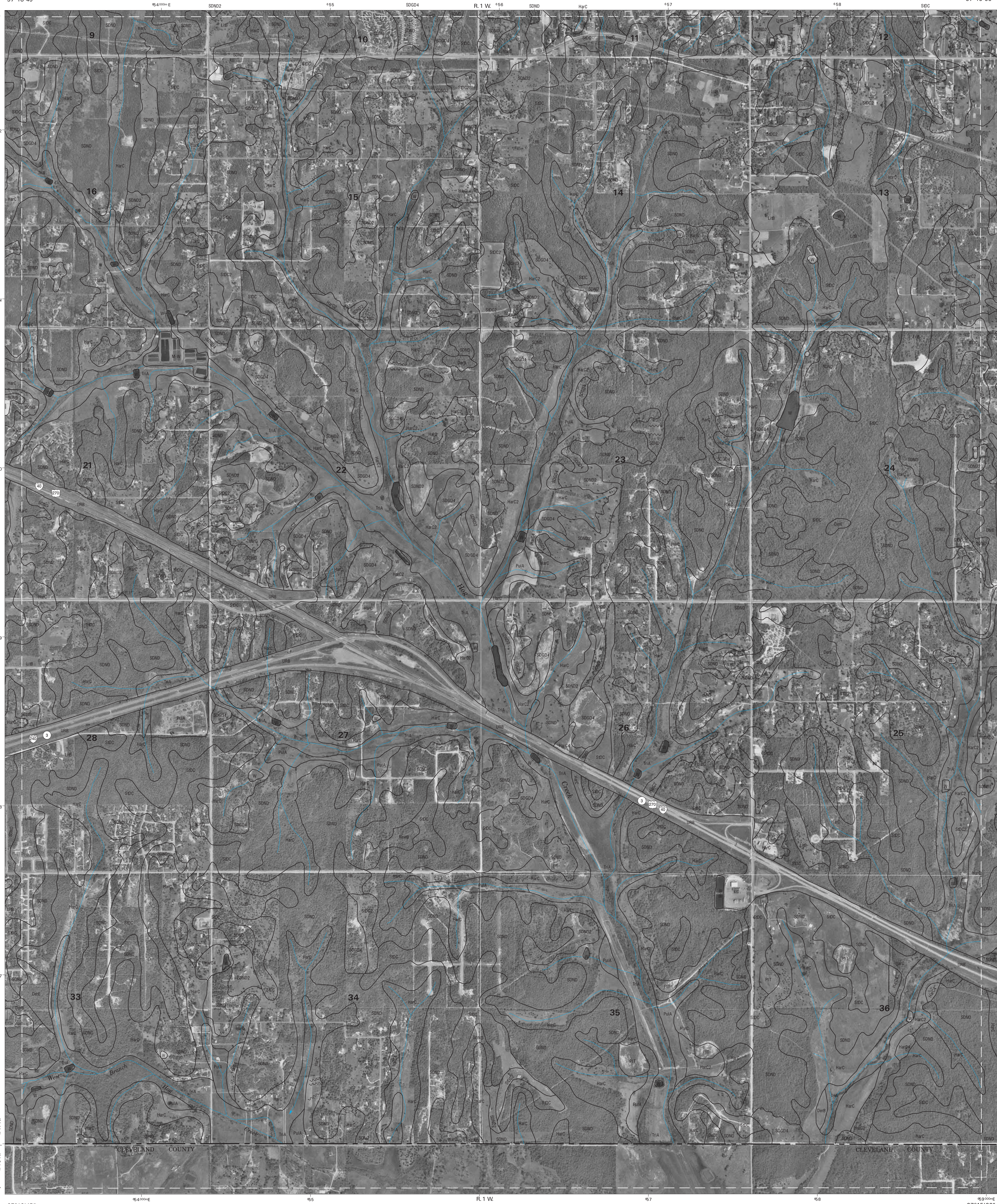


QUARTER QUADRANGLE LOCATION

CHOCTAW SW, OKLAHOMA
3.75 MINUTE SERIES

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
CHOCTAW SE QUADRANGLE
SHEET NUMBER 52 OF 54



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SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

NORTH

QUARTER QUADRANGLE LOCATION

CHOCTAW SE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 52 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
HARRAH SW QUADRANGLE
SHEET NUMBER 53 OF 54

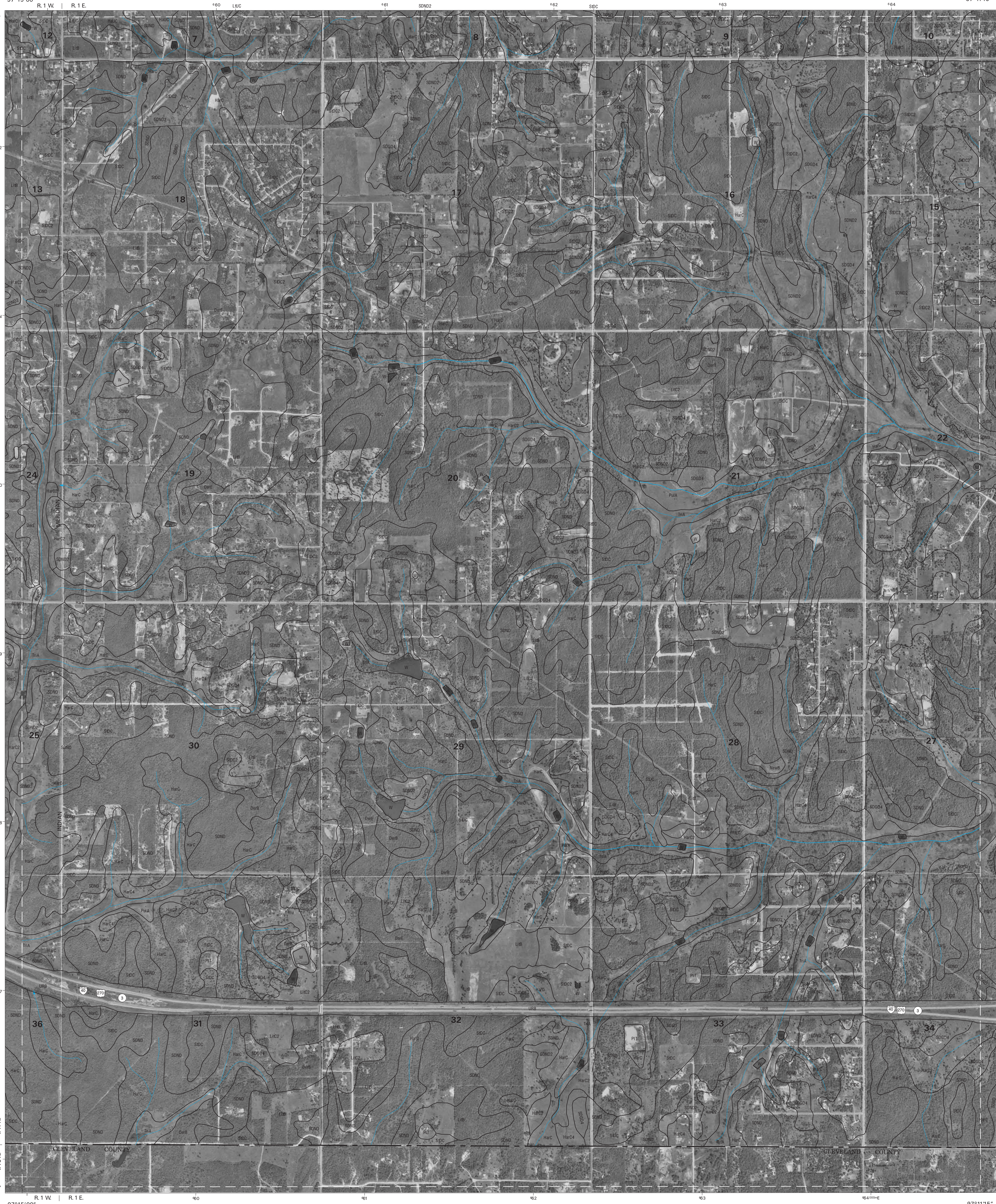
Joins sheet 44, Harrah NW

97°15'00" R. 1 W. | R. 1 E. 97°11'15"

35° 26'15" 35° 26'15"

Joins sheet 52, Choctaw SE

Joins sheet 54, Harrah SE



35° 22'30" R. 1 W. | R. 1 E. 35° 22'30"

97°15'00" 97°11'15"

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NORTH

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

QUARTER QUADRANGLE LOCATION

HARRAH SW, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 53 OF 54

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OKLAHOMA COUNTY, OKLAHOMA
HARRAH SE QUADRANGLE
SHEET NUMBER 54 OF 54

Joins sheet 45, Harrah NE

Joins sheet 53, Harrah SW

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NORTH

SCALE 1:12000

0.5 | 0 | 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 | 0 | 0.5 KILOMETERS

QUARTER QUADRANGLE LOCATION

HARRAH SE, OKLAHOMA
3.75 MINUTE SERIES
SHEET NUMBER 54 OF 54